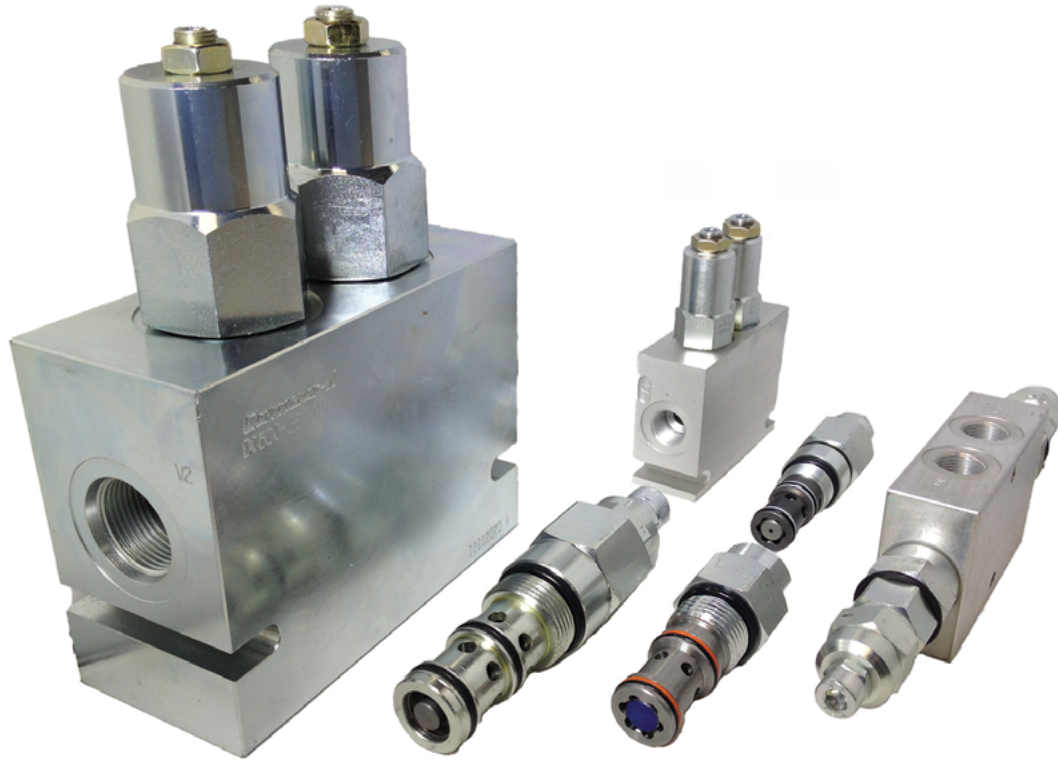


Comatrol

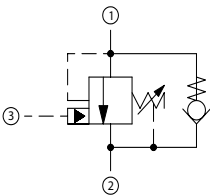
RESPONSIVENESS IN MOTION

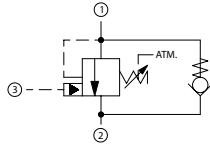
Member of the Danfoss Group

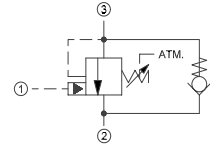


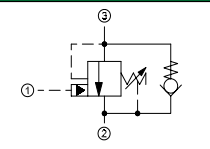
Counterbalance Valves

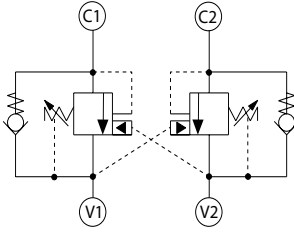
www.comatrol.com

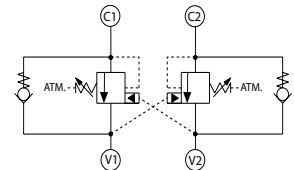
Hydraulic Vent	Model No.	Cavity	Description	Flow*	Pressure	Page
	CP448-1	CP08-3L	Counterbalance Valve, Hydraulic Vent, Pilot Port 3	20 l/min [5 US gal/min]	350 bar [5075 psi]	CB - 6
	CB10-HV	SDC10-3S		60 l/min [16 US gal/min]	350 bar [5075 psi]	CB - 8
	CP441-1	CP12-3S		115 l/min [30 US gal/min]	350 bar [5075 psi]	CB - 10
	CB20-HV	CP20-3S		266 l/min [70 US gal/min]	345 bar [5000 psi]	CB - 12

Atmospheric Vent	Model No.	Cavity	Description	Flow*	Pressure	Page
	CB10-AV	SDC10-3S	Counterbalance Valve, Atmospheric Vent, Pilot Port 3	60 l/min [16 US gal/min]	350 bar [5075 psi]	CB - 14

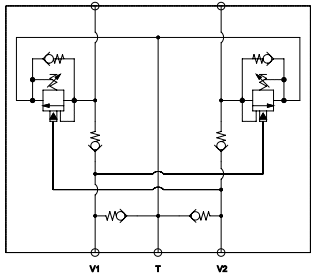
Atmospheric Vent	Model No.	Cavity	Description	Flow*	Pressure	Page
	VCB06-CN	NCS06/3	Counterbalance Valve, Atmospheric Vent, Pilot Port 1	60 l/min [16 US gal/min]	350 bar [5075 psi]	CB - 16
	VCB12-CN	NCS12/3		140 l/min [37 US gal/min]	350 bar [5075 psi]	CB - 18

Hydraulic Vent	Model No.	Cavity	Description	Flow*	Pressure	Page
	VCB06-EN	NCS06/3	Counterbalance Valve, Hydraulic Vent, Pilot Port 1	60 l/min [16 US gal/min]	350 bar [5075 psi]	CB - 20
	VCB12-EN	NCS12/3		140 l/min [37 US gal/min]	350 bar [5075 psi]	CB - 22

Dual Counterbalance	Model No.	Cavity	Description	Flow*	Pressure	Page
	CP448-2	CIB	Dual Counterbalance Valve, Hydraulic Vent, Catalog HIC	20 l/min [5 US gal/min]	350 bar [5075 psi]	CB - 24
	VCB06-EN-DL	CIB		60 l/min [16 gal/min]	350 bar [5075 psi]	CB - 26
	DCB10-HV	CIB		60 l/min [16 US gal/min]	350 bar [5075 psi]	CB - 28
	CP441-2	CIB		115 l/min [30 US gal/min]	350 bar [5075 psi]	CB - 30
	VCB12-EN-DL	CIB		140 l/min [37 US gal/min]	350 bar [5075 psi]	CB - 32
	DCB20-HV	CIB		266 l/min [70 US gal/min]	345 bar [5000 psi]	CB - 34

Dual Counterbalance	Model No.	Cavity	Description	Flow*	Pressure	Page
	VCB06-CN-DL	CIB	Dual Counterbalance Valve, Atmospheric Vent, Catalog HIC, Nose to Nose	60 l/min [16 US gal/min]	350 bar [5075 psi]	CB - 36
	DCB10-AV	CIB		60 l/min [16 US gal/min]	350 bar [5075 psi]	CB - 38
	VCB12-CN-DL	CIB		140 l/min [37 US gal/min]	350 bar [5075 psi]	CB - 40

* Flow ratings are based on a pressure drop of 22 bar [319 psi] unless otherwise noted. They are for comparison purposes only.

Hydraulic Vent	Model No.	Cavity	Description	Flow*		Page
	DCB10-MC	CIB	Dual Counterbalance Valve, With Makeup Checks, Catalog HIC	57 l/min [15 US gal/min]	350 bar [5075 psi]	CB - 42
	DCB12-MC	CIB		95 l/min [25 US gal/min]	350 bar [5075 psi]	CB - 44

MOTION CONTROL VALVES

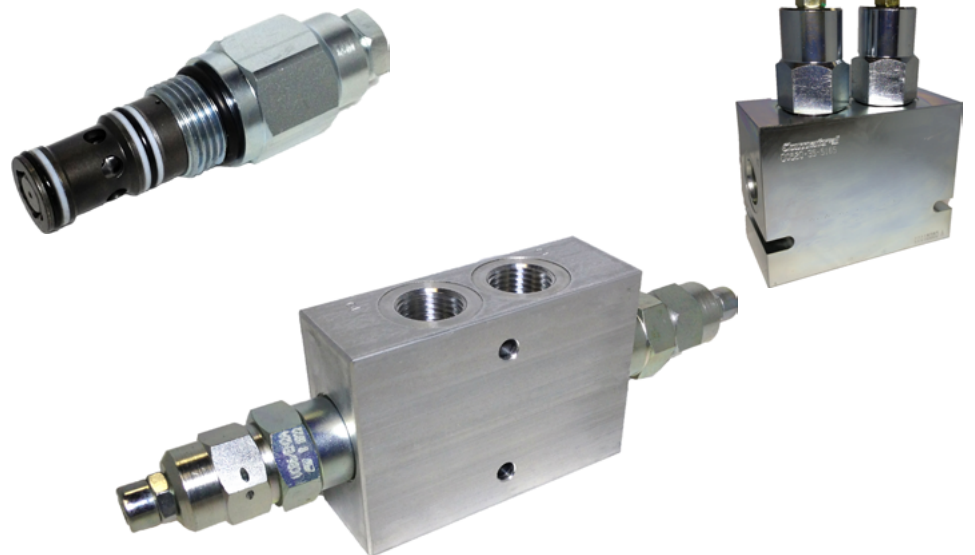
Motion control valves, also referred to as load holding valves, are used to control the motion of a load in the following ways:

- Prevent a load from dropping in case of hose or tube failure.
- Prevent a load from drifting caused by directional control valve spool leakage.
- Provide smooth, modulated motion when the load is in a lowering or run-away mode.
- Provide smooth, modulated motion when the directional control valve is suddenly closed.

There are two basic types of motion control valves:

- Pilot-operated, or pilot-to-open check valves will satisfy the first two of the above requirements.
- Counterbalance valves will satisfy all four of the above requirements.

Counterbalance valves



COUNTERBALANCE VALVES

A counterbalance valve provides several functions:

- Free flow in one direction.
- Leak-free load holding.
- Protection against hydraulic line failure.
- Protection against pressure shocks caused by external forces or overrunning loads
- Cavitation-free motion control to match speed to pump flow when a load could cause loss of control of an actuator (cylinder or motor).
- Smooth, modulated motion control when the directional valve is suddenly closed.

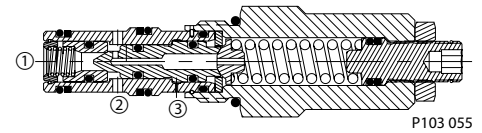
COUNTERBALANCE VALVES
(continued)

Counterbalance valves will positively hold a pressurized load and will control the motion of the load based on application of a pressure signal to the pilot port. Counterbalance valves are available as individual cartridges or standard cartridge-in-body (CIB) packages.

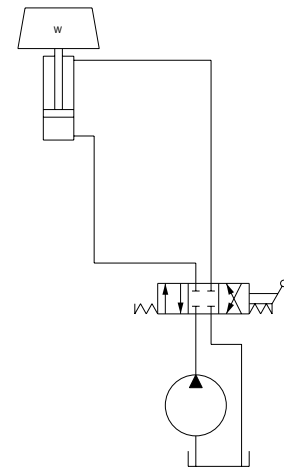
A typical circuit application for a counterbalance valve contains a pump, directional control valve, and an actuator. Without a counterbalance valve the load will drift down due to spool leakage if the directional control valve is centered with the load raised. Additionally there is no protection against the load dropping in the event of hydraulic line failure.

Adding a counterbalance valve controls motion and provides protection against hose or tube failure. In this circuit, moving the directional control valve to the left causes the cylinder to extend, raising the load with free flow going through the check valve portion of the counterbalance valve. When the directional control valve is centered, the counterbalance valve will prevent leakage and lock the load in position. Moving the directional control valve to the right sends flow/pressure to the rod end of the cylinder. This pressure also acts to pilot open the counterbalance valve and allows the load to be lowered. Should the load cause the cylinder to run away from the pump, pilot pressure to the counterbalance valve will decrease and the counterbalance valve will modulate to match the cylinder speed to the pump flow.

Individual cartridge counterbalance valve

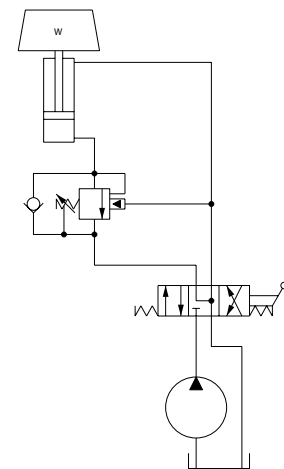


Circuit without a counterbalance valve



P103 121

Circuit with a counterbalance valve



P103 122

COUNTERBALANCE VALVES
 (continued)

The pressure required to pilot open the counterbalance valve can be calculated as follows:

$$P = \frac{(P_s \cdot A_b) - W}{(A_b \cdot R) + A_r} \text{ (load retracts cylinder)}$$

$$P = \frac{(P_s \cdot A_r) - W}{(A_r \cdot R) + A_b} \text{ (load extends cylinder)}$$

W = Load

P_s = Counterbalance valve relief setting; see below for more information

A_b = Cylinder bore area

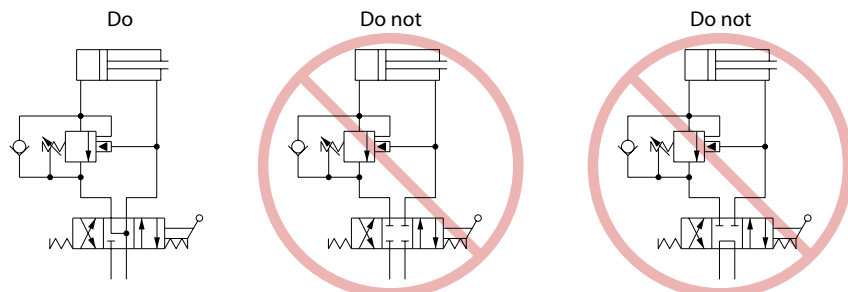
A_r = Cylinder bore area-Cylinder rod area

R = Counterbalance valve pilot ratio; see below for more information

Note that these equations are idealized and do not consider any backpressure in the circuit, which is additive to the pressure required to pilot open the check valve.

Some additional guidelines for counterbalance valve applications:

- Specify the counterbalance valve relief setting high enough to stop any motion (flow) at the maximum expected actuator pressure. Generally it is recommended to use a setting of 1.3 multiplied by the maximum load pressure.
- Use low pilot ratios (3:1 and 4.5:1) for applications where loads may vary widely. Low pilot ratios require higher pilot pressure and are less efficient but provide stable, precise control for varying loads.
- Use high pilot ratios (8:1 and 10:1) for applications where loads are relatively constant. High pilot ratio valves require lower pilot pressure, have faster response, and are more efficient, but lack stability and precision in response to varying loads.
- Do not oversize counterbalance valves. There is no pressure drop operating limit for counterbalance valves and in fact some pressure drop is required to maintain valve operation.
- Locate counterbalance valves at or near the actuator to provide maximum load holding protection in the event of hydraulic line failure.
- Do not use counterbalance valves with closed-center directional control valves. Pressure trapped between the directional control valve and the actuator can pilot the counterbalance valve open and result in undesired load motion.
- Do not use counterbalance valves with tandem-center directional control valves. Backpressure in the system can prevent the counterbalance valve from opening.



OPERATION

This 3-ported, externally piloted counterbalance valve is 8-size, cartridge style, low leakage with hydraulic vent. The check section allows free flow from the directional valve (port 2) to the load (port 1), while normally blocking flow from port 1 to port 2. Reverse flow is blocked until pilot pressure is applied at port 3. When the load pressure at port 1 rises above the pressure setting, the relief valve is activated and pressure is relieved from port 1 to port 2.



APPLICATIONS

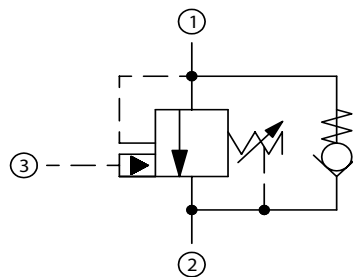
Single counterbalance valves are normally used when the load is unidirectional, such as aerial lifts, cranes, or winches. In load holding applications, they can be used as hose-break valves when installed close to or in an actuator. Dual valves can be used for controlling loads bi-directionally in motor applications, or for cylinders going over center.

SPECIFICATIONS

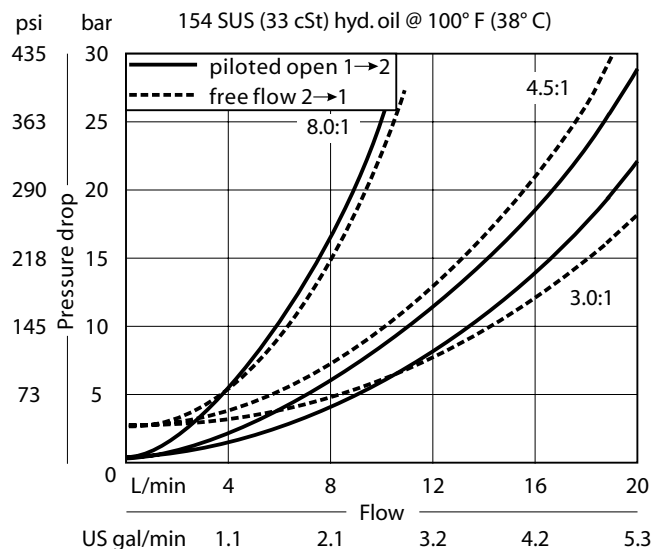
Rated pressure	350 bar [5075 psi]*
Rated flow at 22 bar (319 psi)	20 l/min [5 US gal/min]
Leakage	10 drops/min @ 70% of crack pressure
Weight	0.16 kg [0.36 lb]
Pilot ratio	3:1, 4.5:1, 8:1
Cavity	CP08-3L

* 350 bar with steel housing
 210 bar with aluminum housing

SCHEMATIC

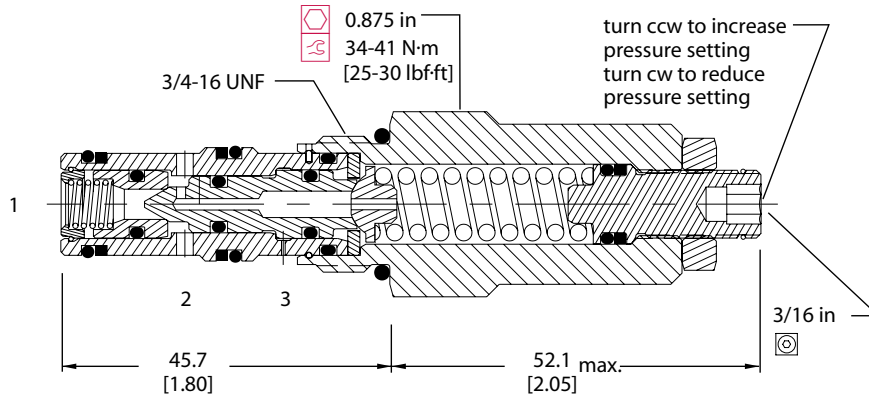


PERFORMANCE



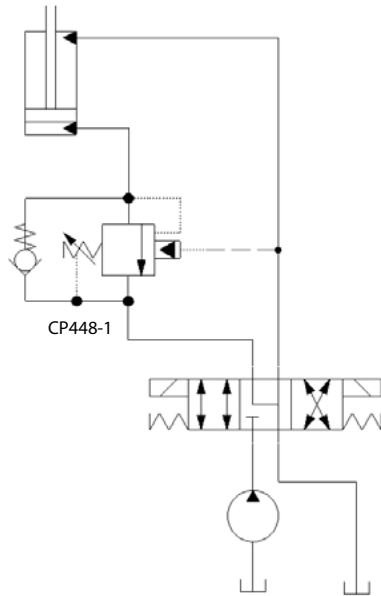
DIMENSIONS

mm [in]

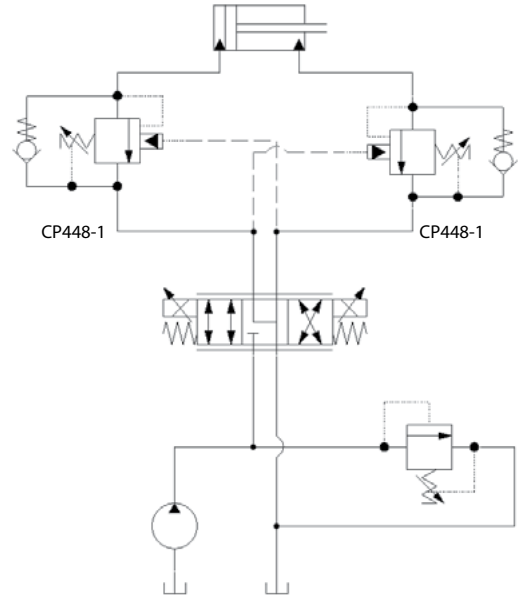


EXAMPLE CIRCUITS

Load Holding - Single Actuator



Load Holding - Double Actuator



ORDERING INFORMATION

CP448 - 1 - B - 6S - E - B - XXX - 4.5 - 040

CP448-1:
Counterbalance
valve, 8 size,
hydraulic vent

Code	Seal Material	Seal Kit
B	Buna-N	120238
V	Viton	120239

E:
External
Adjustment

Code	Pilot Ratio
3.0	3.0:1
4.5	4.5:1
8.0	8.0:1

Free flow check
crack pressure in psi

Code	psi	[bar]
040	40	2.76

Pressure Setting [in psi]

XXX - Standard setting with no stamping

For customer specified setting,
code x 10 = total psi
Example: 150 x 10 = 1500 psi (insert 150 above)

Housing & Ports	Housing P/N
0 Cartridge Only	No Body
2B AL, 1/4 BSP	CP08-3L-2B
3B AL, 3/8 BSP	CP08-3L-3B
S3B Steel, 3/8 BSP	CP08-3L-S3B
4S AL, #4 SAE	CP08-3L-4S
6S AL, #6 SAE	CP08-3L-6S
S6S Steel, #6 SAE	CP08-3L-S6S

Pressure Range

Code	Pilot Ratio 3.0 psi [bar]	Pilot Ratio 4.5 psi [bar]	Pilot Ratio 8.0 psi [bar]
A	600-1500 [41-103] Std. Setting 1000 [69]	363-1740 [55-172] Std. Setting 1500 [103]	1500-5000 [103-345] Std. Setting 2500 [172]
B	1000-3000 [69 - 207] Std. Setting 1500 [103]	870-2900 [103-345] Std. Setting 2500 [172]	
C	1800-5000 [124 - 345] Std. Setting 2500 [172]		

OPERATION

CB10-HV : Counterbalance valve, 10-size, hydraulic vent.
 This valve is 3-ported, externally piloted and low leakage.
 The check section allows free flow from the directional valve (port 2) to the load (port 1), while normally blocking flow from port 1 to port 2. Reverse flow is blocked until pilot pressure is applied at port 3. When the load pressure at port 1 rises above the pressure setting, the intergral relief valve is activated and pressure is relieved from port 1 to port 2.



APPLICATIONS

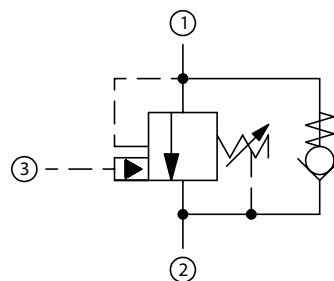
Single counterbalance valves are normally used when the load is unidirectional, such as aerial lifts, cranes, or winches. In load holding applications, they can be used as hose-break valves when installed near or within an actuator. Dual valves can be used for controlling loads bi-directionally in motor applications, or for cylinders going over center.

SPECIFICATIONS

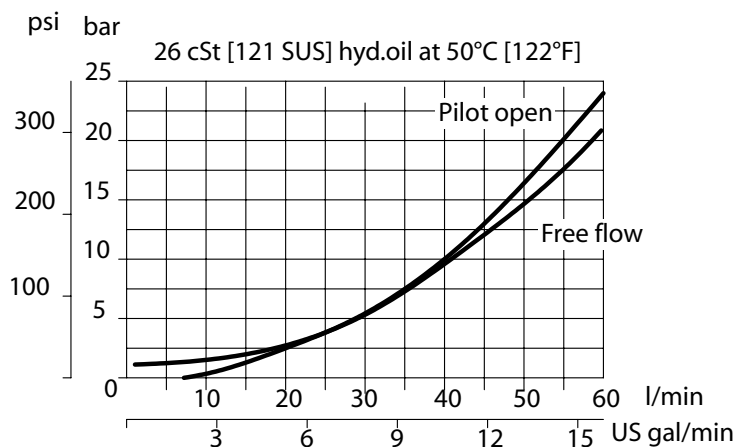
Rated pressure	350 bar [5075 psi]*
Rated flow at 22 bar (319 psi)	60 l/min [16 US gal/min]
Leakage	10 drops/min @ 70% of crack pressure
Weight	0.22 kg [0.47 lb]
Pilot ratio	3:1, 4.5:1, 10:1
Cavity	SDC10-3S

* 350 bar with steel housing
 210 bar with aluminum housing

SCHEMATIC

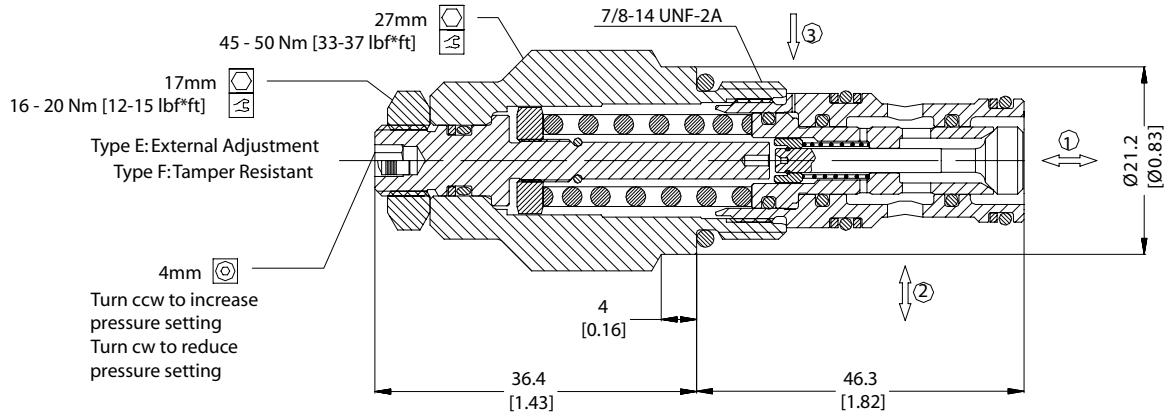


PERFORMANCE



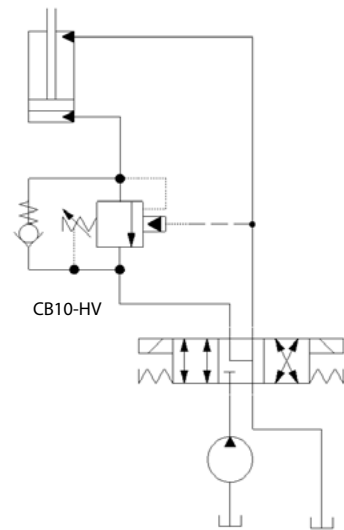
DIMENSIONS

mm [in]

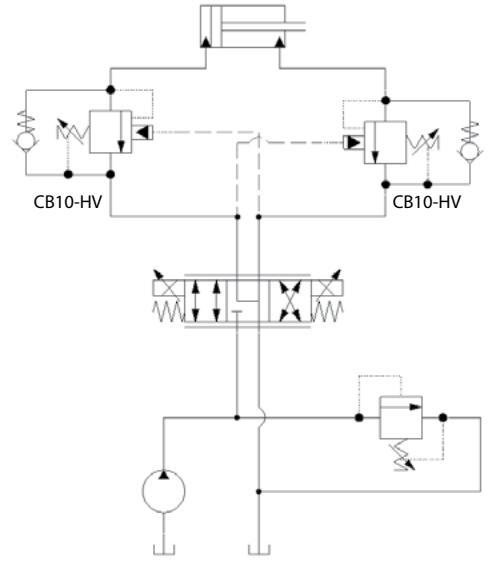


EXAMPLE CIRCUITS

Load Holding - Single Actuator



Counterbalance-Double Actuator



CB - Counterbalance Valves
CB10-HV

ORDERING INFORMATION

CB10 - HV - 1 - A - 1 - E - XXX - B - 00

CB10- HV:
Counterbalance valve,
10-size, hydraulic vent

Code	Pilot Ratio
A	3 to 1
B	4.5 to 1
C	10 to 1

1: Check crack pressure in bar 1 bar [14.5 psi]

Code	Pilot Ratio A (3:1) bar (psi)	Pilot Ratio B (4.5:1) bar (psi)	Pilot Ratio C (10:1) bar (psi)
1	35-110 [507-1595]	55-180 [797-2610]	90-350 [1305-5075]
2	60-150 [870 - 2175]	75-240 [1087-3480]	
3	80-230 [1160 - 3334]	90-350 [1305-5075]	

Code	Seal	Seal Kit
B	Buna-N	230001020
V	Viton	35401519

Pressure Setting [in bar]
XXX - No factory setting / no stamping

For customer specified settings, enter value in bar (Example 70 bar = 70; 125 bar = 125, etc.)

Adjustment type
E external adjustment
F tamper resistant

Body & Ports	Body Nomenclature
00 Cartridge Only	No Body
SE3B AL, 3/8 BSPP	SDC10-3S-SE3B
SE4B AL, 1/2 BSPP	SDC10-3S-SE4B
SES4B Steel, 1/2 BSPP	SDC10-3S-SES4B
SE4B AL, 1/2 BSPP	SDC10-3S-SE4B
6S AL, #6 SAE	SDC10-3S-6S
8S AL, #8 SAE	SDC10-3S-8S
S8S Steel, #8 SAE	SDC10-3S-S8S

OPERATION

This 3-ported, externally piloted unit is a 12-size cartridge style, low leakage counterbalance valve with hydraulic vent. The check section allows free flow from the directional valve (port 2) to the load (port 1), while normally blocking flow from port 1 to port 2. Reverse flow is blocked until pilot pressure is applied at port 3. When the load pressure at port 1 rises above the pressure setting, the integral relief valve is activated and pressure is relieved from port 1 to port 2.



APPLICATIONS

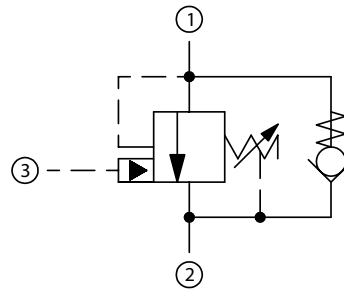
Single counterbalance valves are normally used when the load is unidirectional, such as aerial lifts, cranes, or winches. In load holding applications, they can be used as hose-break valves when installed near or within an actuator. Dual valves can be used for controlling loads bi-directionally in motor applications, or for cylinders going over center.

SPECIFICATIONS

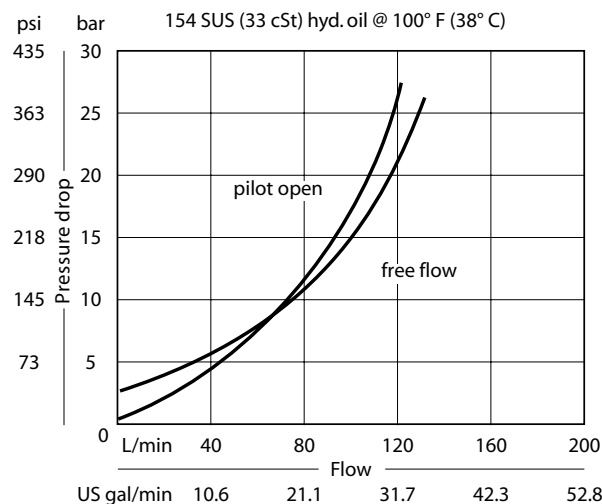
Rated pressure	350 bar [5075 psi]*
Rated flow at 22 bar (319 psi)	115 l/min [30 US gal/min]
Leakage	10 drops/min @ 70% of crack pressure
Weight	0.22 kg [0.48 lb]
Pilot ratio	3:1, 4.5:1, 10:1
Cavity	CP12-3S

* 350 bar with steel housing
 210 bar with aluminum housing

SCHEMATIC

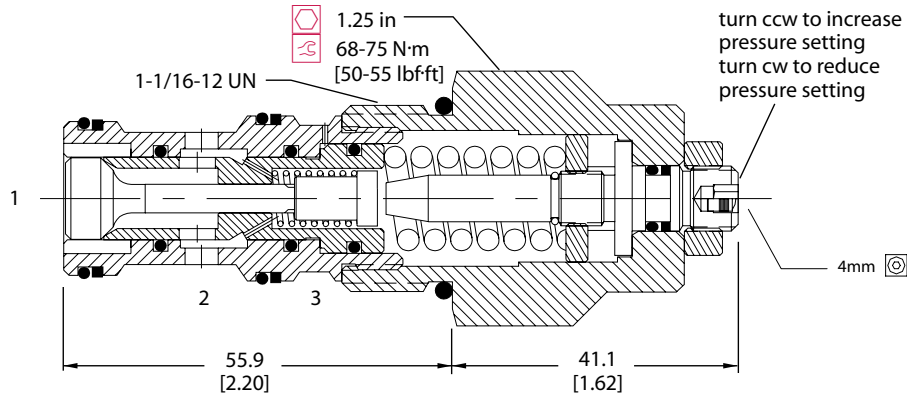


PERFORMANCE



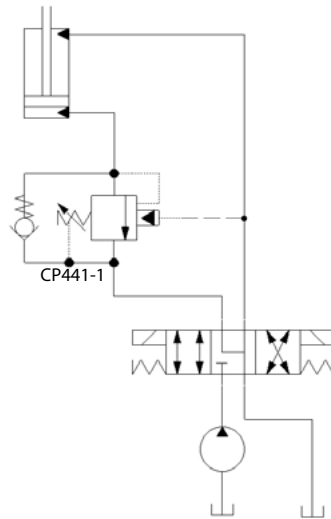
DIMENSIONS

mm [in]

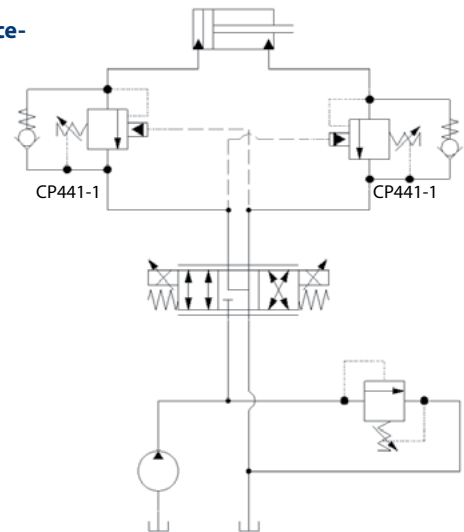


EXAMPLE CIRCUITS

Load Holding - Single Actuator



Counterbalance - Double Actuator



CB - Counterbalance Valves
CP441-1

ORDERING INFORMATION

CP441 - 1 - B - 12S - E - B - XXX - 4.5 - 015

CP441-1:
Counterbalance valve, 12 size, hydraulic vent

Code	Seal Material	Seal Kit
B	Buna-N	120335
V	Viton	120336

E:
External Adjustment

Code	Pilot Ratio
3.0	3.0:1
4.5	4.5:1
10.0	10.0:1

Free flow check crack pressure in psi

Code	psi	[bar]
005	5	.34
015	15	1.05

Pressure Setting [in psi]

XXX - Standard setting with no stamping

For customer specified setting, code x 10 = total psi
Example: 150 x 10 = 1500 psi (insert 150 above)

Housing & Ports	Housing P/N
0 Cartridge Only	No Body
4B AL, 1/2 BSP	CP12-3S-4B/2B
6B AL, 3/4 BSP	CP12-3S-6B/2B
S6B Steel, 3/4 BSP	CP12-3-S6B/4S
10S AL, #10 SAE	CP12-3S-10S/4S
12S AL, #12 SAE	CP12-3S-12S/4S
S12S Steel, #12 SAE	CP12-3-S12S/4S

Pressure Range

Code	Pilot Ratio 3.0:1 psi [bar]	Pilot Ratio 4.5:1 psi [bar]	Pilot Ratio 10.0:1 psi [bar]
A	500-1500 [34-103] Std. Setting 1000 [69]	500-2000 [34-138] Std. Setting 1500 [103]	100-5000 [69-345] Std. Setting 2500 [172]
B	1500-3000 [103-207] Std. Setting 2500 [172]	1500-5000 [103-345] Std. Setting 3000 [207]	

OPERATION

CB20-HV : Counterbalance valve, 20-size, hydraulic vent. This is a 3-ported, externally piloted, cartridge style, low leakage unit. The check section allows free flow from the directional valve (port 2) to the load (port 1), while normally blocking flow from port 1 to port 2. Reverse flow is blocked until pilot pressure is applied at port 3. When the load pressure at port 1 rises above the pressure setting, the integral relief valve is activated and pressure is relieved from port 1 to port 2.



APPLICATIONS

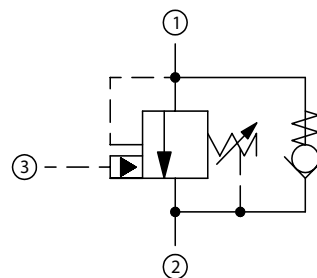
Single counterbalance valves are normally used when the load is unidirectional, such as aerial lifts, cranes, or winches. In load holding applications, they can be used as hose-break valves when installed near or within an actuator. Dual valves can be used for controlling loads bi-directionally in motor applications, or for cylinders going over center.

SPECIFICATIONS

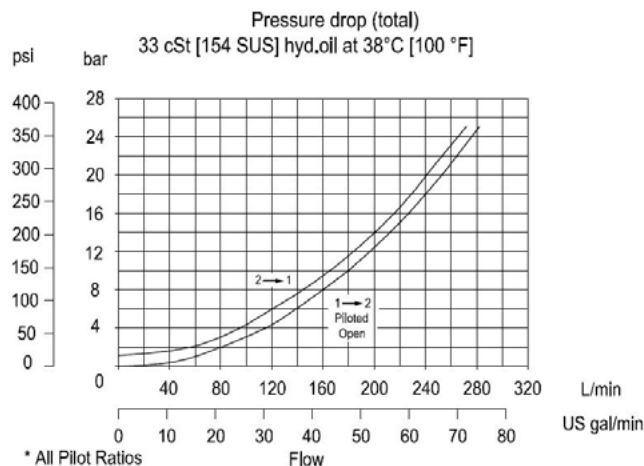
Rated pressure	345 bar [5000 psi]*
Rated flow at 22 bar (319 psi)	266 l/min [70 US gal/min]
Leakage	10 drops/min @ 70% of crack pressure
Weight	1.22 kg [2.69 lb]
Pilot ratio	3:1, 4.5:1, 10:1
Cavity	CP20-3S

* 345 bar with steel housing
 210 bar with aluminum housing

SCHEMATIC



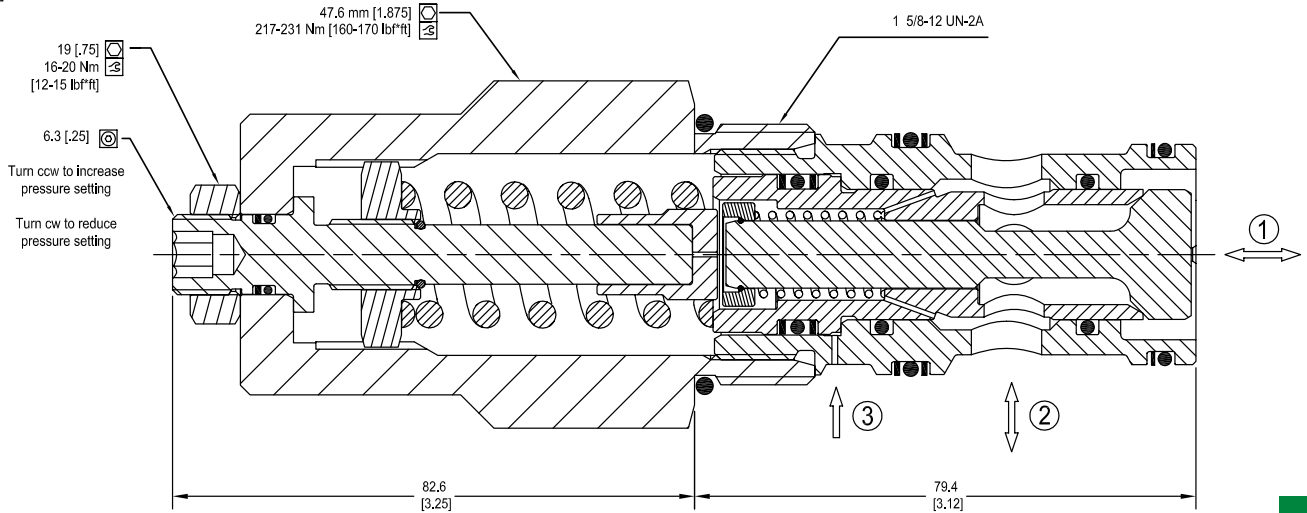
PERFORMANCE



CB - Counterbalance Valves
 CB20-HV

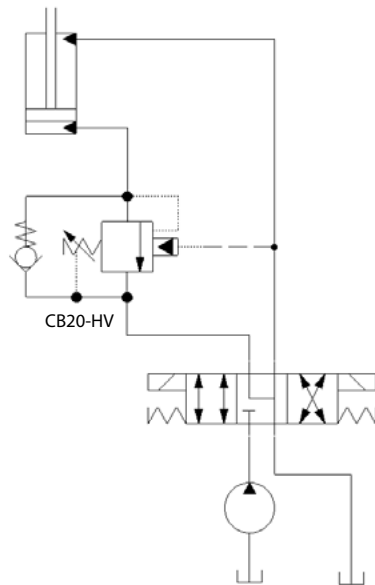
DIMENSIONS

mm [in]

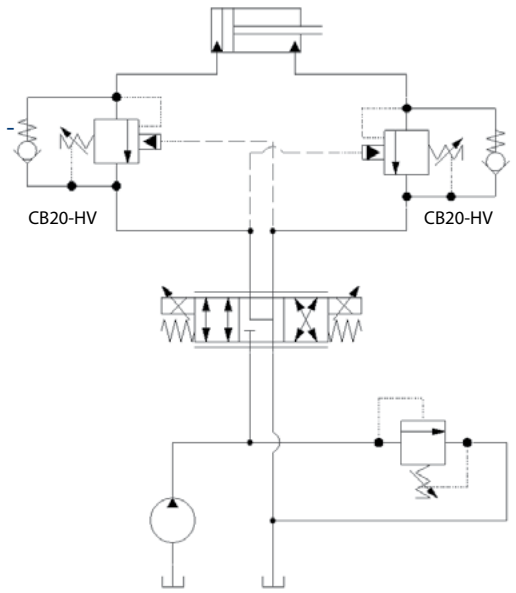


EXAMPLE CIRCUITS

Load Holding - Single Actuator



Load Holding - Double Actuator



CB - Counterbalance Valves
CB20-HV

ORDERING INFORMATION

CB20 - HV - 1 - A - 1 - E - XXX - B - 00

CB20-HV:
Counterbalance valve,
20-size, hydraulic vent

Code	Pilot Ratio
A	3 to 1
B	4.5 to 1
C	10 to 1

1: Check crack pressure in bar 1 bar [14.5 psi]

Code	Seal	Seal Kit
B	Buna-N	120380
V	Viton	120381

Pressure Setting in bar
XXX - Std. setting with no stamping

For customer specified settings, enter value in bar (Example 70 bar = 70; 125 bar = 125, etc.)

Code	Pressure Range		
	Pilot Ratio A (3:1) bar [psi]	Pilot Ratio B (4.5:1) bar [psi]	Pilot Ratio C (10:1) bar [psi]
1	35-110 [507-1595] Std. Setting 70 [1015]	35-140 [507-2030] Std. Setting 100 [1450]	70-345 [1015-5000] Std. Setting 170 [2465]
2	100-210 [1450-3045] Std. Setting 170 [2465]	100-345 [1450-5000] Std. Setting 200 [2900]	

Adjustment type
E external adjustment

Body & Ports	Body Nomenclature
00 Cartridge Only	No Body
8B AL, 1 BSP	CP20-3S-8B/2B
S8B Steel, 1 BSP	CP20-3S-S8B/2B
10B AL, 1-1/4 BSP	CP20-3S-10B/2B
S10B Steel, 1-1/4 BSP	CP20-3S-S10B/2B
16S AL, #16 SAE	CP20-3S-16S/4S
S16S Steel, #16 SAE	CP20-3S-S16S/4S
20S AL, #20 SAE	CP20-3S-20S/4S
S20S Steel, #20 SAE	CP20-3S-S20S/4S

OPERATION

CB10-AV : Counterbalance valve, 10-size, atmospheric vent. This is a 3-ported, externally piloted, cartridge style, low leakage unit. The check section allows free flow from the directional valve (port 2) to the load (port 1). Reverse flow is blocked until pilot pressure is applied at port 3. When the pressure at port 1 rises above the pressure setting, the integral relief valve is activated and vents the area behind the pilot piston.



APPLICATIONS

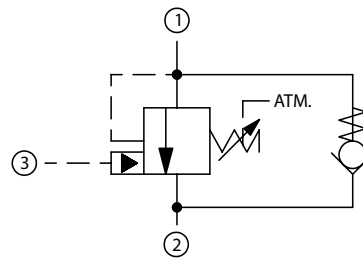
Atmospheric vented valves are applied when it is not practical to connect a separate vent line to the tank. Use a single counterbalance valves when the load is unidirectional, such as aerial lifts, cranes, or winches. In load holding applications, they can be used as hose-break valves when installed near or within an actuator. Dual valves can be used for controlling loads bi-directionally in motor applications, or for cylinders going over center.

SPECIFICATIONS

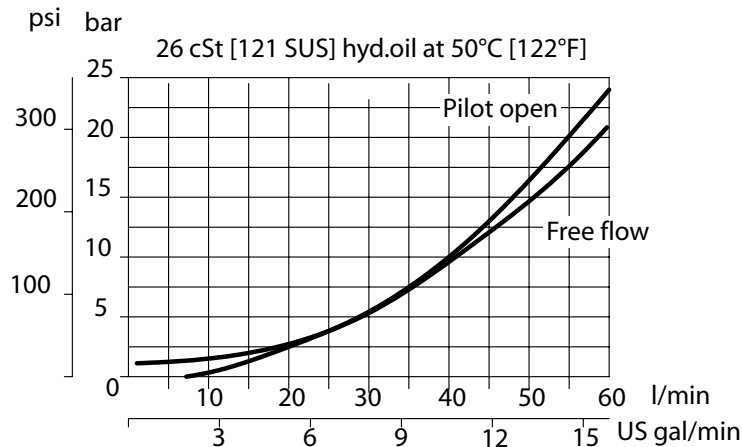
Rated pressure	350 bar [5075 psi]*
Rated flow at 22 bar (319 psi)	60 l/min [16 US gal/min]
Leakage	10 drops/min @ 70% of crack pressure
Weight	0.27 kg [0.60 lb]
Pilot ratio	3:1, 4.5:1, 10:1
Cavity	SDC10-3S

* 350 bar with steel housing
 210 bar with aluminum housing

SCHEMATIC

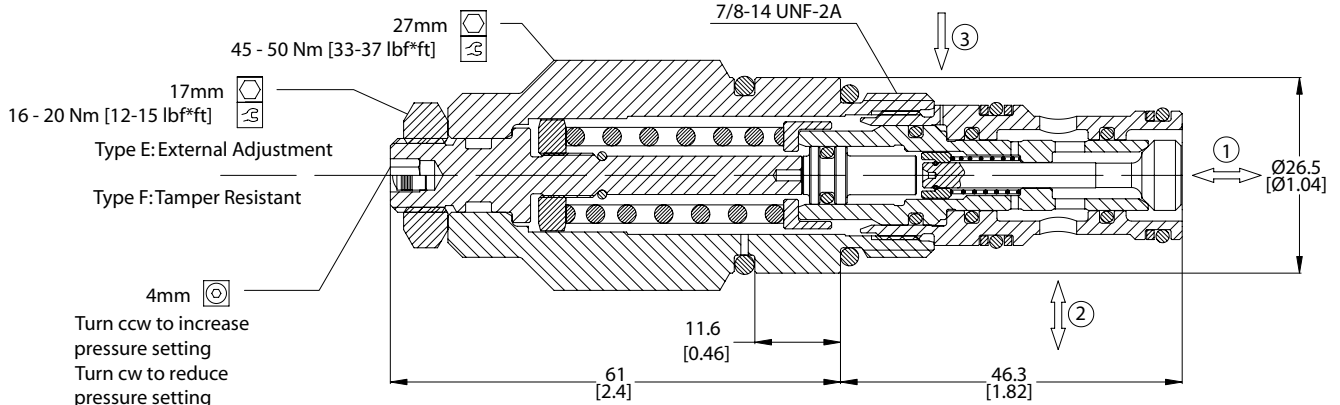


PERFORMANCE



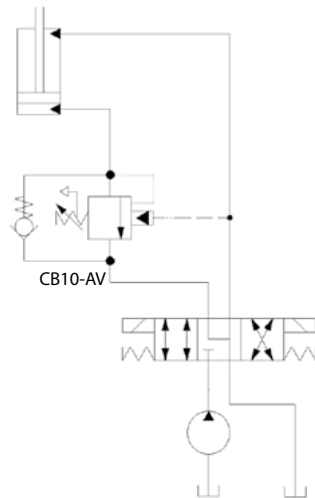
DIMENSIONS

mm [in]

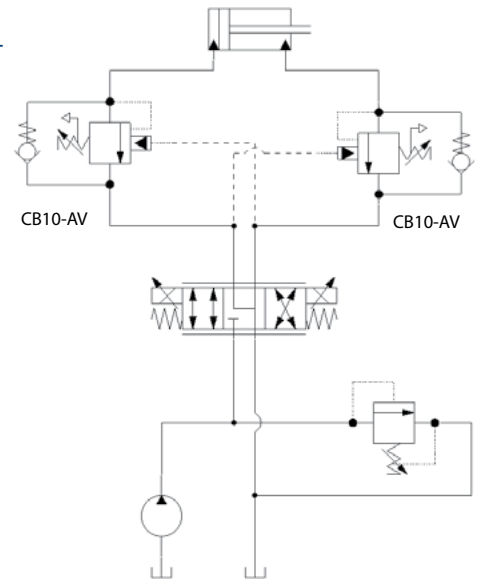


EXAMPLE CIRCUITS

Load Holding - Single Actuator



Counterbalance - Double Actuator



ORDERING INFORMATION

CB10 - AV - 1 - A - 1 - E - XXX - B - 00

CB10-AV: Counterbalance valve, 10-size, atmospheric vent

Code	Pilot Ratio
A	3 to 1
B	4.5 to 1
C	10 to 1

1: Check crack pressure in bar 1 bar [14.5 psi]

Code	Pilot Ratio A (3:1) bar (psi)	Pilot Ratio B (4.5:1) bar (psi)	Pilot Ratio C (10:1) bar (psi)
1	35-110 [507-1595]	55-180 [797-2610]	90-350 [1305-5075]
2	60-150 [870 - 2175]	75-240 [1087-3480]	
3	80-230 [1160 - 3334]	90-350 [1305-5075]	

Code	Seal	Seal Kit
B	Buna-N	230001020
V	Viton	35401519

Pressure Setting [in bar]
XXX - No factory setting / no stamping

For customer specified settings, enter value in bar (Example: 70 bar = 70; 125 bar = 125, etc.)

Body & Ports	Body Nomenclature
00 Cartridge Only	No Body
SE3B AL, 3/8 BSPP	SDC10-3S-SE3B
SE4B AL, 1/2 BSPP	SDC10-3S-SE4B
SE54B Steel, 1/2 BSPP	SDC10-3S-SE54B
SE4B AL, 1/2 BSPP	SDC10-3S-SE4B
6S AL, #8 SAE	SDC10-3S-6S
8S AL, #8 SAE	SDC10-3S-8S
S8S Steel, #8 SAE	SDC10-3-S8S

Adjustment type
E external adjustment
F tamper resistant

OPERATION

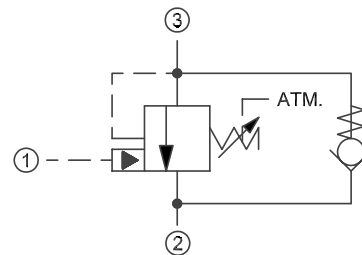
This counterbalance valve is a 6-size metric, 3-ported, externally piloted low leakage, cartridge style valve with atmospheric vent. The check section allows free flow from the directional valve (port 2) to the load (port 3), while normally blocking flow from port 3 to port 2. Reverse flow is blocked until pilot pressure is applied at port 1. When the pressure at port 3 rises above the pressure setting, the integral relief valve is activated and vents the area behind the pilot piston.



APPLICATIONS

Atmospheric vented valves are applied when it is not practical to connect a separate vent line to the tank. Use a single counterbalance valve when the load is unidirectional, such as aerial lifts, cranes, or winches. In load holding applications, they are suitable as hose-break valves when installed near or within an actuator. Dual cartridges can be used for controlling loads bi-directionally in motor applications, or for cylinders going over center. Since this valve is piloted at port 1, no cross port drilling is required when dual cartridges are mounted nose to nose in an HIC.

SCHEMATIC

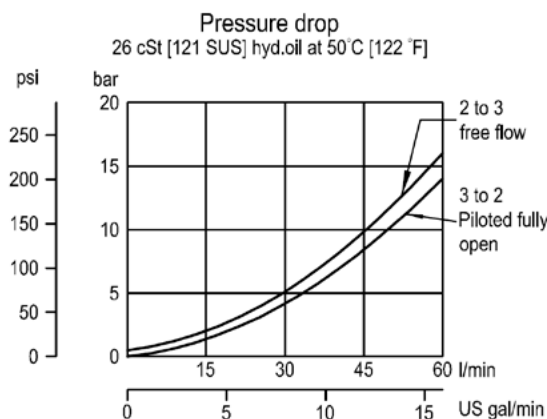


SPECIFICATIONS

Rated pressure	350 bar [5075 psi]*
Rated flow at 22 bar (319 psi)	60 l/min [16 US gal/min]
Leakage	10 drops/min @ at 70% of crack pressure
Weight	0.29 kg [0.65 lb]
Pilot ratio	4.1:1, 7.1:1
Cavity	NCS06/3

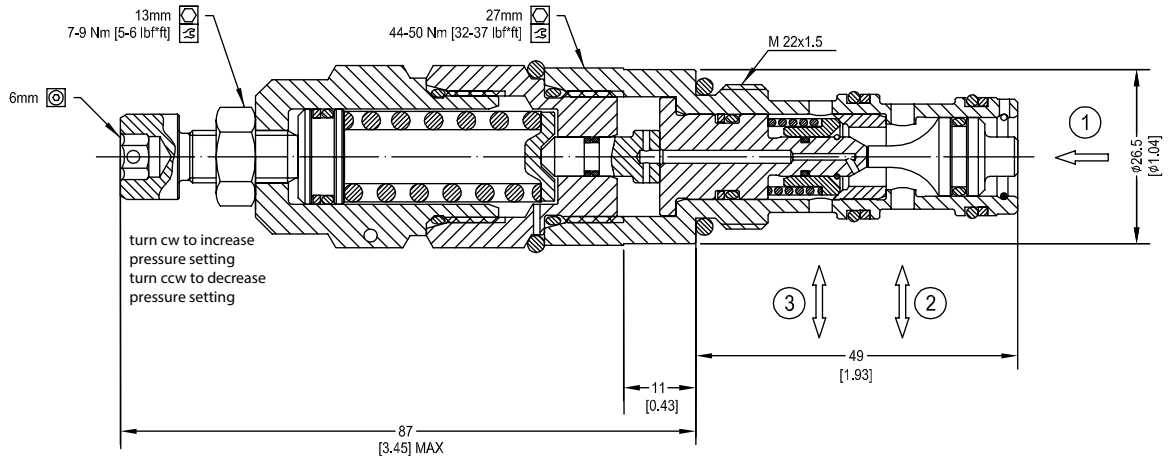
* 350 bar with steel housing
 210 bar with aluminum housing

PERFORMANCE



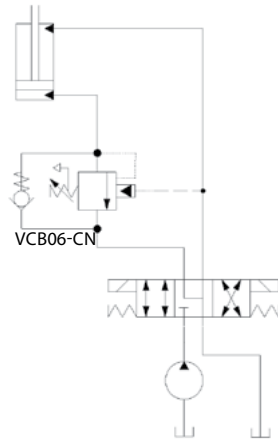
DIMENSIONS

mm [in]

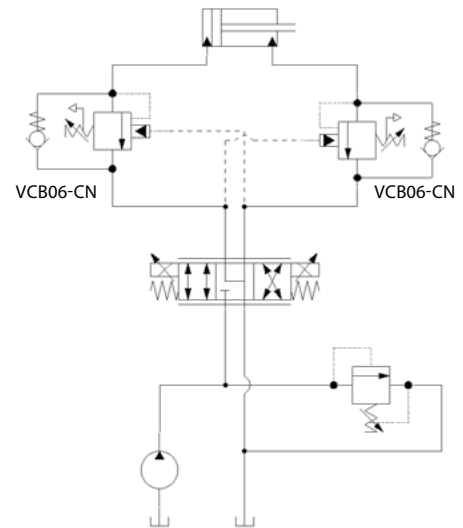


EXAMPLE CIRCUITS

Load Holding - Single Actuator



Counterbalance with Pressure Limiting



CB - Counterbalance Valves
VCB06-CN

ORDERING INFORMATION

VCB06 - CN - 2 - A - 00 - B - XXX

VCB06-CN:
Counterbalance Valve, Pilot Port 1,
6 size (metric), internal adjustment,
atmospheric vent

Code	Pressure Range bar [psi]
1	25-140 [363-2030]
2	70 - 210 [1015-3045]
3	105 - 350 [1523-5075]

Code	Pilot Ratio
A	7:1:1
B	4:1:1

Code	Seal Material	Seal Kit
B	Buna-N	230000070
V	Viton	230000110

Crack Pressure Setting [in bar]

XXX: No factory setting / no stamping

For customer specified settings,
enter value in bar (Example 70 bar = 70;
125 bar = 125 etc.)

Housing & Ports	Housing Nomenclature
00: Cartridge Only	No Body
SE3B: AL, 3/8 BSP	NCS06-3-SE3B
SE4B: AL, 1/2 BSP	NCS06-3-SE4B
SE6S: AL, #6 SAE	NCS06-3-SE6S
SE6S: Steel, #6 SAE	NCS06-3-SE6S
SE8S: AL, #8 SAE	NCS06-3-SE8S

OPERATION

This counterbalance valve is a 12 size metric, 3-ported, externally piloted low leakage, cartridge style valve with atmospheric vent. The check section allows free flow from the directional valve (port 2) to the load (port 3), while normally blocking flow from port 3 to port 2. Reverse flow is blocked until pilot pressure is applied at port 1. When the pressure at port 3 rises above the pressure setting, the integral relief valve is activated and vents the area behind the pilot piston.



APPLICATIONS

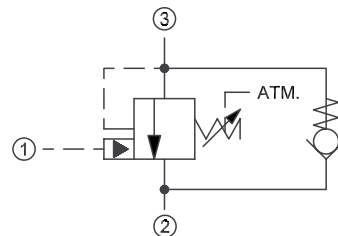
Atmospheric vented valves are applied when it is not practical to connect a separate vent line to the tank. Use a single counterbalance valve when the load is unidirectional, such as aerial lifts, cranes, or winches. In load holding applications, they are suitable for use as hose-break valves when installed near or within an actuator. Dual cartridges can be used for controlling loads bi-directionally in motor applications, or for cylinders going over center. Since this valve is piloted at port 1, no cross port drilling is required when dual cartridges are mounted nose to nose in an HIC.

SPECIFICATIONS

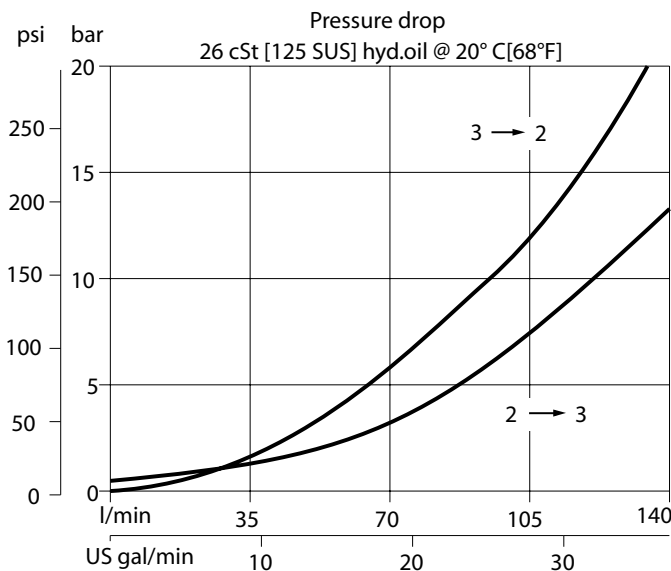
Rated pressure	350 bar [5075 psi]*
Rated flow at 22 bar (319 psi)	140 l/min [37 US gal/min]
Weight	0.93 kg [2.05 lb]
Pilot ratio	4.7:1, 5.9:1, 6.9:1
Cavity	NCS12/3

* 350 bar with steel housing
 210 bar with aluminum housing

SCHEMATIC

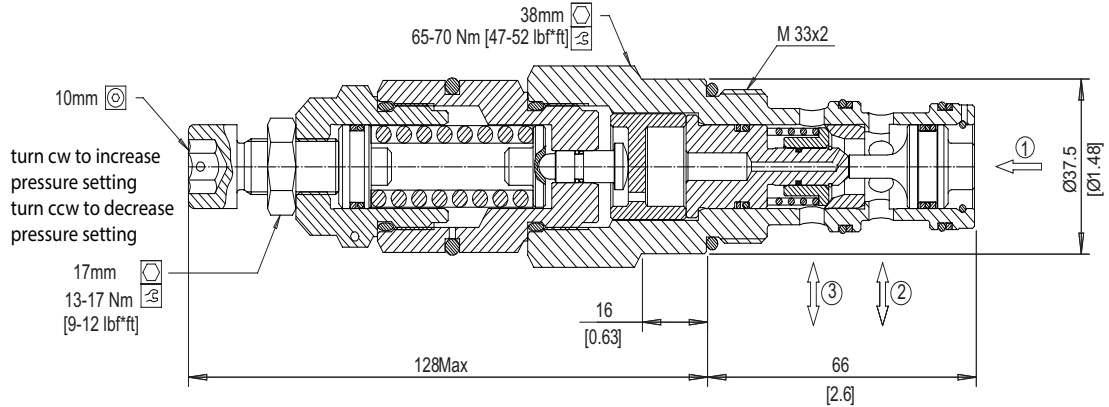


PERFORMANCE



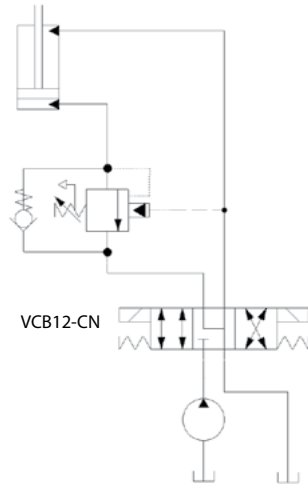
DIMENSIONS

mm [in]

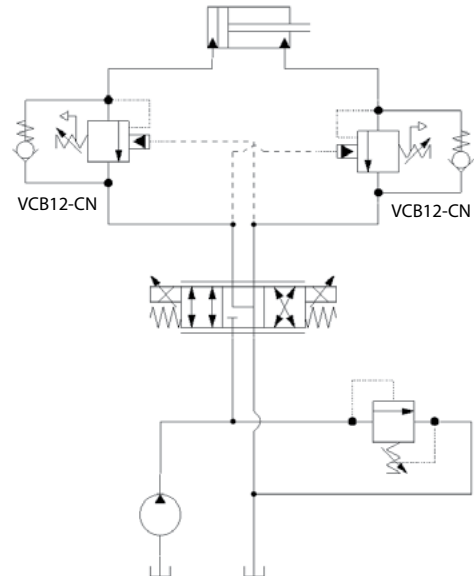


EXAMPLE CIRCUITS

Load Holding - Single Actuator



Load Holding - Double Actuator



CB - Counterbalance Valves
VCB12-CN

ORDERING INFORMATION

VCB12 - CN - 2 - A - 00 - B - XXX

VCB12-CN:
Counterbalance Valve, Pilot Port 1, 12 size (metric), internal adjustment, atmospheric vent

Code	Pilot Ratio
A	6.9:1
B	4.7:1
C	5.9:1

Pressure Range

Code	Pilot Ratio A,C bar [psi]	Pilot Ratio B bar [psi]
1	25-140 [363-2031]	25-120 [363-1740]
2	70 - 250 [1015-3625]	60-200 [870-2900]
3	105 - 350 [1523-5075]	90-280 [1305-4060]

Code	Seal Material
B	Buna-N
V	Viton

Crack Pressure Setting [in bar]

XXX: No factory setting / no stamping

For customer specified settings, enter value in bar (Example 70 bar = 70; 125 bar = 125 etc.)

Housing & Ports	Housing Nomenclature
00: Cartridge Only	No Body
SE4B: AL, 1/2 BSP	NCS12-3-SE4B
SE6B: AL, 3/4 BSP	NCS12-3-SE6B
SES6B: Steel, 3/4 BSP	NCS12-3-SES6B
SE8S: AL, #8 SAE	NCS12-3-SE8S
SE12S: AL, #12 SAE	NCS12-3-SE12S

OPERATION

The VCB06-EN is a cartridge style, 6-size metric counterbalance valve with hydraulic vent. This valve is 3-ported, externally piloted and low leakage. The check section allows free flow from the directional valve (port 2) to the load (port 3). Reverse flow is blocked until pilot pressure is applied at port 1. When the load pressure at port 3 rises above the pressure setting, the integral relief valve is activated and pressure is relieved from port 3 to port 2.



APPLICATIONS

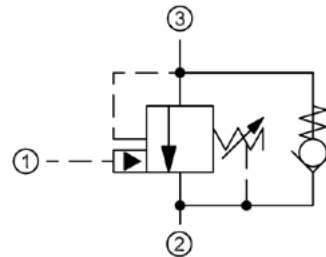
Single counterbalance valves are normally used when the load is unidirectional, such as aerial lifts, cranes, or winches. In load holding applications, they can be used as hose-break valves when installed near or within an actuator. Dual cartridges can be used for controlling loads bi-directionally in motor applications, or for cylinders going over center. Since this valve is piloted at port 1, no cross port drilling is required when dual cartridges are mounted nose to nose in an HIC.

SPECIFICATIONS

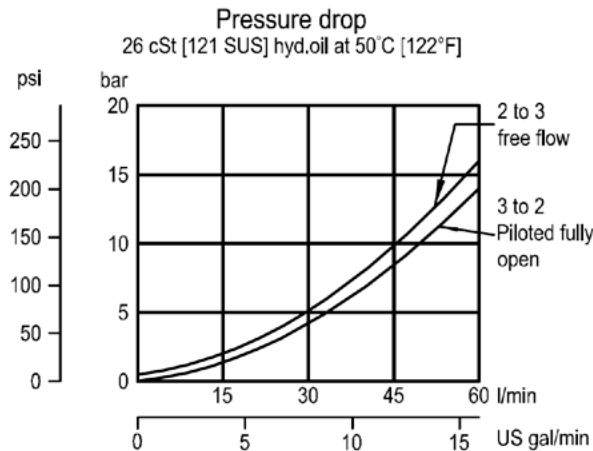
Rated pressure	350 bar [5075 psi]*
Rated flow at 22 bar (319 psi)	60 l/min [16 US gal/min]
Leakage	10 drops/min @ at 70% of crack pressure
Weight	0.21 kg [0.47 lb]
Pilot ratio	4.1:1, 7.1:1
Cavity	NCS06/3

* 350 bar with steel housing
 210 bar with aluminum housing

SCHEMATIC

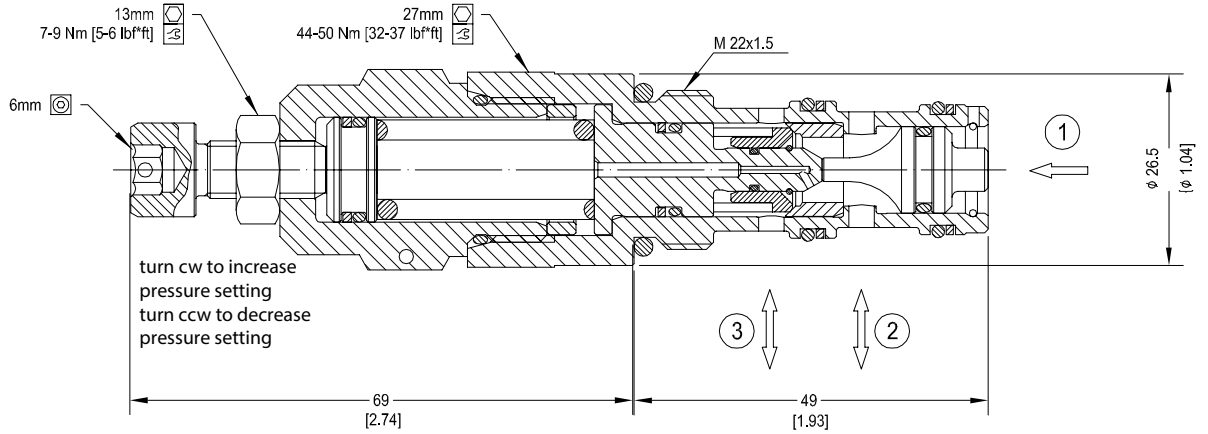


PERFORMANCE



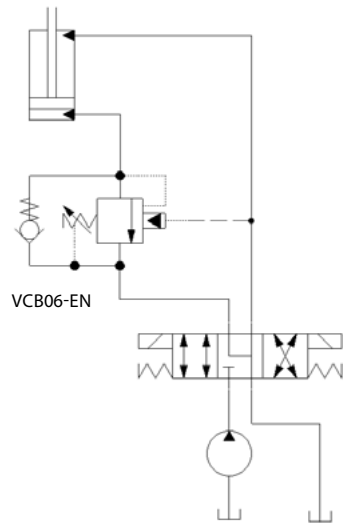
DIMENSIONS

mm [in]

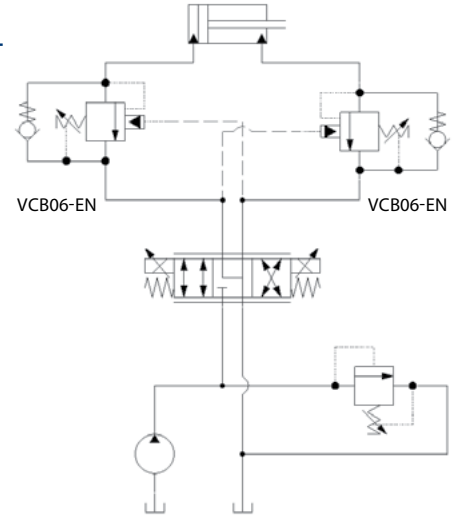


EXAMPLE CIRCUITS

Load Holding - Single Actuator



Counterbalance - Double Actuator



CB - Counterbalance Valves
VCB06-EN

ORDERING INFORMATION

VCB06 - EN - 2 - A - 00 - B - XXX

VCB06-EN: Counterbalance Valve, Pilot Port 1, 6 size (metric), external adjustment, hydraulic vent

Crack Pressure Setting [in bar]

XXX: No factory setting / no stamping

For customer specified settings, enter value in bar (Example 70 bar = 70; 125 bar = 125 etc.)

Code	Pressure Range bar (psi)
1	25-140 [363-2030]
2	70 - 210 [1015-3045]
3	105 - 350 [1523-5075]

Code	Pilot Ratio
A	7.1:1
B	4.1:1

Code	Seal Material	Seal Kit
B	Buna-N	230000070
V	Viton	230000110

Housing & Ports	Housing Nomenclature
00: Cartridge Only	No Body
SE3B: AL, 3/8 BSP	NCS06-3-SE3B
SE4B: AL, 1/2 BSP	NCS06-3-SE4B
SE6S: AL, #6 SAE	NCS06-3-SE6S
SES6S: Steel, #6 SAE	NCS06-3-SES6S
SE8S: AL, #8 SAE	NCS06-3-SE8S

OPERATION

The VCB12-EN is a cartridge style, 12-size metric counterbalance valve with hydraulic vent. This valve is 3- ported, externally piloted and low leakage. The check section allows free flow from the directional valve (port 2) to the load (port 3). Reverse flow is blocked until pilot pressure is applied at port 1. When the load pressure at port 3 rises above the pressure setting, the integral relief valve is activated and pressure is relieved from port 3 to port 2.



APPLICATIONS

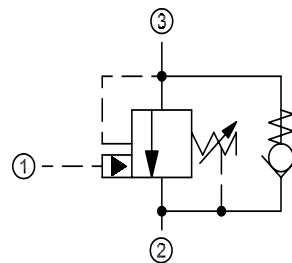
Single counterbalance valves are normally used when the load is unidirectional, such as aerial lifts, cranes, or winches. In load holding applications, they can be used as hose-break valves when installed near or within an actuator. Dual cartridges can be used for controlling loads bi-directionally in motor applications, or for cylinders going over center. Since this valve is piloted at port 1, no cross port drilling is required when dual cartridges are mounted nose to nose in an HIC.

SPECIFICATIONS

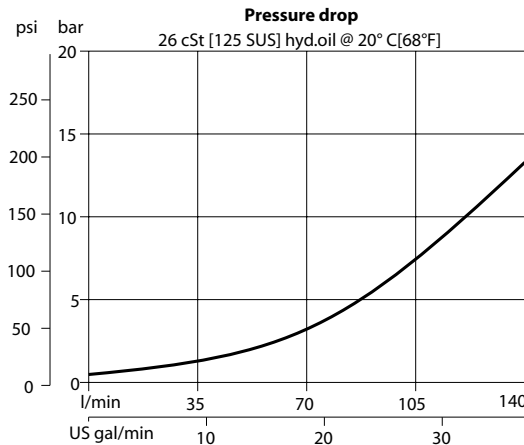
Rated pressure	350 bar [5075 psi]*
Rated flow at 22 bar (319 psi)	140 l/min [37 US gal/min]
Leakage	10 drops/min @ at 70% of crack pressure
Weight	0.7 kg [1.58 lb]
Pilot ratio	4.7:1, 5.9:1, 6.9:1
Cavity	NCS12/3

* 350 bar with steel housing
 210 bar with aluminum housing

SCHEMATIC

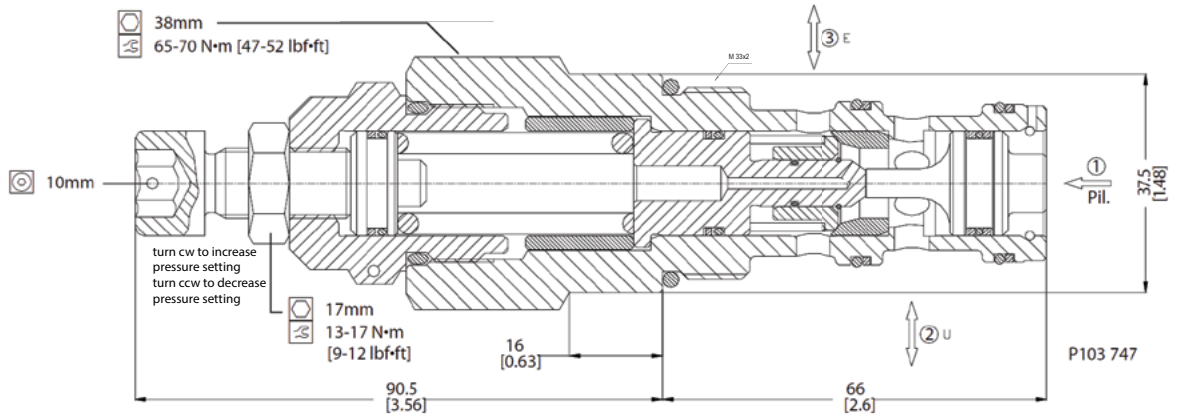


PERFORMANCE



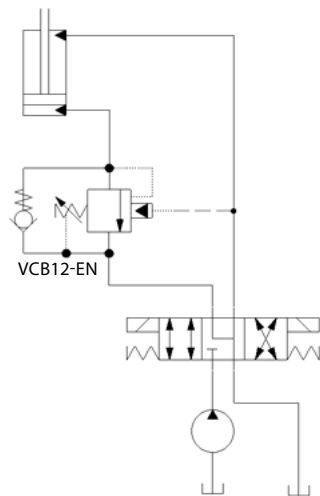
DIMENSIONS

mm [in]

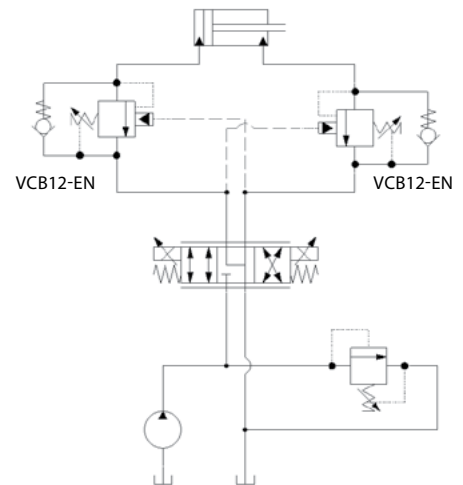


EXAMPLE CIRCUITS

Load Holding - Single Actuator



Counterbalance - Double Actuator



CB - Counterbalance Valves
 VCB12-EN

ORDERING INFORMATION

VCB12 - EN - 2 - A - 00 - B - XXX

VCB12-EN:
 Counterbalance Valve, Pilot Port 1, 12 size (metric), external adjustment, hydraulic vent

Code	Pilot Ratio
A	6.9:1
B	4.7:1
C	5.9:1

Pressure Range

Code	Pilot Ratio A,C bar [psi]	Pilot Ratio B bar [psi]
1	25-140 [363-2031]	25-120 [363-1740]
2	70 - 250 [1015-3625]	60-200 [870-2900]
3	105 - 350 [1523-5075]	90-280 [1305-4060]

Code	Seal Material
B	Buna-N
V	Viton

Crack Pressure Setting [in bar]

XXX: No factory setting / no stamping

For customer specified settings, enter value in bar (Example 70 bar = 70; 125 bar = 125 etc.)

Housing & Ports	Housing Nomenclature
00: Cartridge Only	No Body
SE4B: AL, 1/2 BSP	NCS12-3-SE4B
SE6B: AL, 3/4 BSP	NCS12-3-SE6B
SES6B: Steel, 3/4 BSP	NCS12-3-SES6B
SE8S: AL, #8 SAE	NCS12-3-SE8S
SE12S: AL, #12 SAE	NCS12-3-SE12S

OPERATION

This dual valve, internally piloted HIC is a low leakage counterbalance assembly with hydraulic vent. The CP448-2 uses two CP448-1 8-size cartridges and allows free flow from the V ports to the C ports and blocks flow in the reverse direction until the relief setting is reached, or until adequate pilot pressure has been applied to the opposite V port.



APPLICATIONS

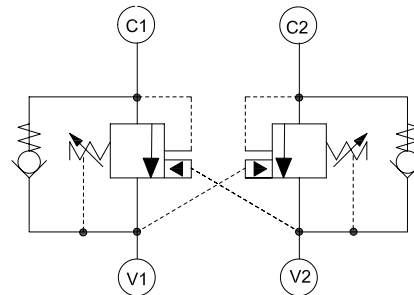
Dual counterbalance HIC's are used for controlling loads in bidirectional motion such as wheel motor applications or for cylinders going over center. They are also suitable for use on the boom and dipper cylinder on an excavator.

SPECIFICATIONS

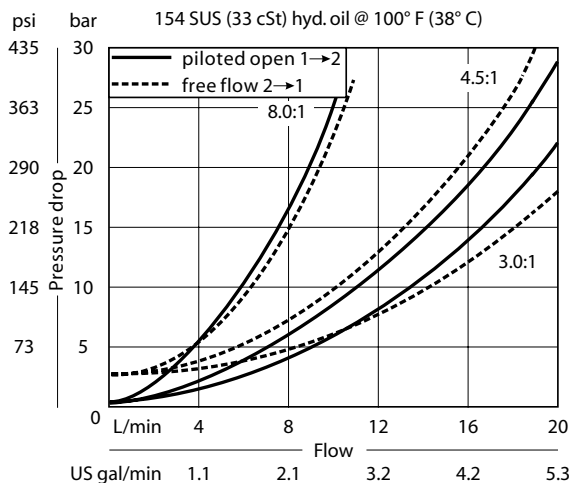
Rated pressure	350 bar [5075 psi]*
Rated flow at 22 bar (319 psi)	20 l/min [5 US gal/min]
Weight	0.78 kg [1.72 lb]
Pilot ratio	3:1, 4.5:1, 8:1
Cavity	CIB

* 350 bar with steel housing
 210 bar with aluminum housing

SCHEMATIC

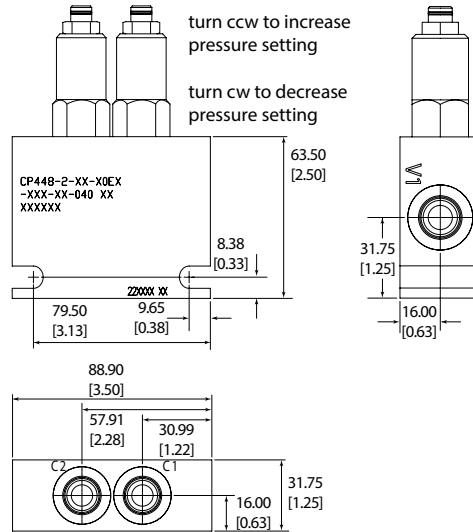


PERFORMANCE



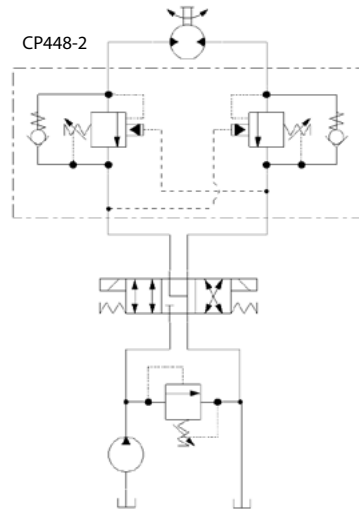
DIMENSIONS

mm [in]

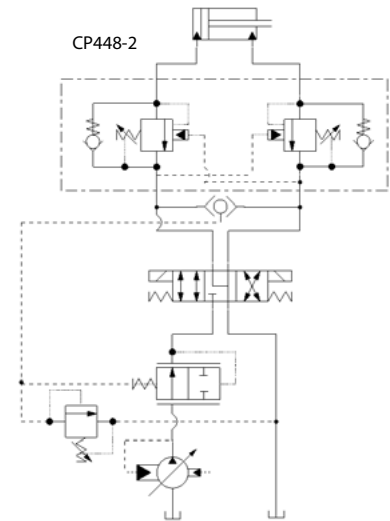


EXAMPLE CIRCUITS

Bi-directional Motion Control



Bi-directional Load Holding



CB - Counterbalance Valves
 CP448-2

ORDERING INFORMATION

CP448 - 2 - 6S - B - E - B - XXX - 4.5 - 040

CP448-2:
 Dual Counterbalance valve, 8 size, hydraulic vent

Housing & Ports	Housing P/N
3B AL, 3/8 BSP	CP448-2-3B
S3B Steel, 3/8 BSP	CP448-2-S3B
4S AL, #4 SAE	CP448-2-4S
6S AL, #6 SAE	CP448-2-6S

E:
 External Adjustment

Code	Pilot Ratio
3.0	3.0:1
4.5	4.5:1
8.0	8.0:1

Free flow check crack pressure in psi

Code psi [bar]
 040 = 40 2.8

Pressure Setting [in psi]
 XXX - Standard setting with no stamping

For customer specified setting,
 code x 10 = total psi
 Example: 150 x 10 = 1500 psi (insert 150 above)

Pressure Range

Code	Pilot Ratio 3.0 psi [bar]	Pilot Ratio 4.5 psi [bar]	Pilot Ratio 8.0 psi [bar]
A	600-1500 [41-103] Std. Setting 1000 [69]	363-1740 [55-172] Std. Setting 1500 [103]	1500-5000 [103-345] Std. Setting 2500 [172]
B	1000-3000 [69 - 207] Std. Setting 1500 [103]	870-2900 [103-345] Std. Setting 2500 [172]	
C	1800-5000 [124 - 345] Std. Setting 2500 [172]		

Code	Seal Material	Seal Kit
B	Buna-N	120238
V	Viton	120239

OPERATION

This is a dual counterbalance HIC, 6-size metric, hydraulically vented, internally-piloted, low leakage, with a nose to nose design. The VCB06-EN-DL allows free flow from the V ports to the C ports and blocks flow in the reverse direction until the relief setting is reached, or until adequate pilot pressure has been applied to the opposite V port.



APPLICATIONS

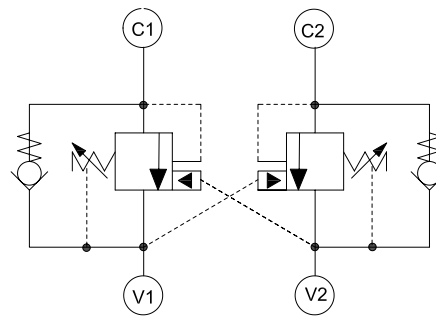
Use dual counterbalance HIC's for controlling loads in bidirectional motion such as wheel motor applications or for cylinders going over center. They are also suitable for use on the boom and dipper cylinder on an excavator.

SPECIFICATIONS

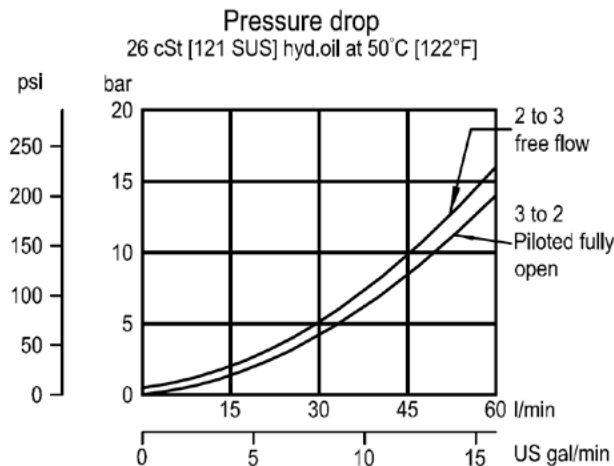
Rated pressure	350 bar [5075 psi]*
Rated flow at 22 bar (319 psi)	60 l/min [16 US gal/min]
Leakage	10 drops/min @ at 70% of crack pressure
Weight	1.02 kg [2.25 lb]
Pilot ratio	4.1:1, 7.1:1
Cavity	CIB

* 350 bar with steel housing
 210 bar with aluminum housing

SCHEMATIC



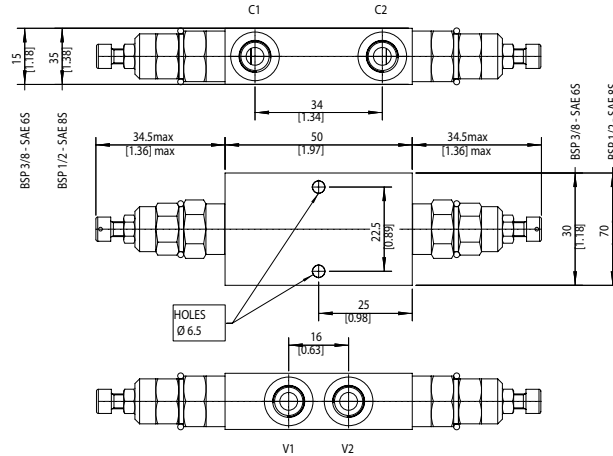
PERFORMANCE



CB - Counterbalance Valves
 VCB06-EN-DL

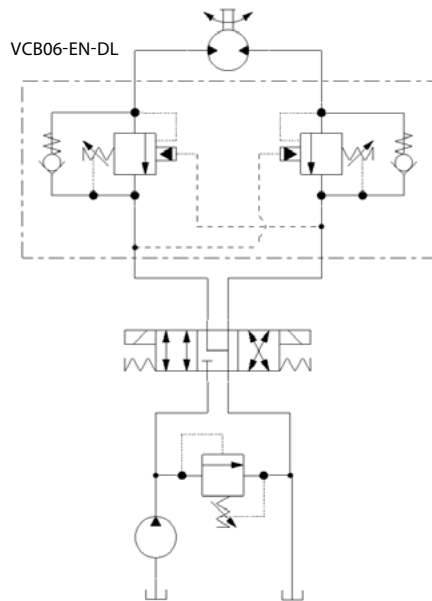
DIMENSIONS

mm [in]

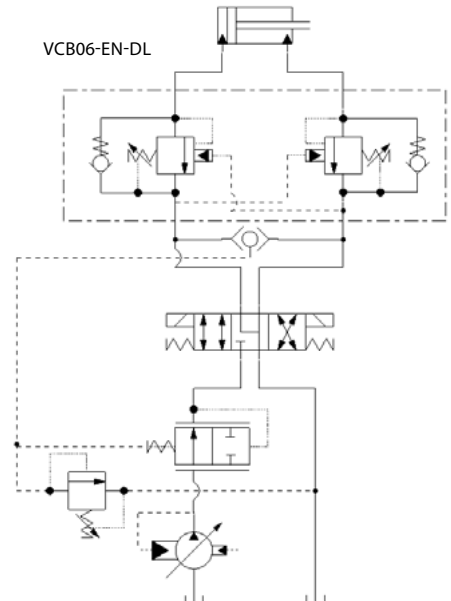


EXAMPLE CIRCUITS

Bi-directional Counterbalance



Counterbalance with Pressure Limiting



CB - Counterbalance Valves
 VCB06-EN-DL

ORDERING INFORMATION

VCB06 - EN - 2 - A - 00 - B - XXX

Counterbalance Valve, Pilot Port 1, 06 size (metric), external adjustment, hydraulic vent

Crack Pressure Setting [in bar]
 XXX: No factory setting/no stamping
 For customer specified settings, enter value in bar (Example 70 bar=70; 125 bar=125 ect.)

Code	Pilot Ratio
1	25-140 [363-2030]
2	70-210 [1015-3045]
3	105-350 [1523-5075]

Seal Option	Seal Material	Seal kit
B	BUNA	230000070
V	VITON	230000110

Code	Pilot Ratio
A	7.1:1
B	4.1:1

Code	Ports & Material	Body Nomenclature
00	00 = Cartridge only	No Body
DL3B	AL, 3/8 BSP	NCS06/3-DL3/8
DL4B	AL, 1/2 BSP	NCS06/3-DL1/2
DL6S	AL, #6 SAE	NCS06/3-DL6S
DL8S	AL, #8 SAE	NCS06/3-DL8S

OPERATION

DCB10-HV: Dual counterbalance HIC, 10-size, hydraulic vent. This is an internally piloted, low leakage assembly. The DCB10-HV uses 2 CB10-HV 10-size cartridges and allows free flow from the V port to the C ports and blocks flow in the reverse direction until the relief setting is reached, or until adequate pilot pressure has been applied to the opposite V port.



APPLICATIONS

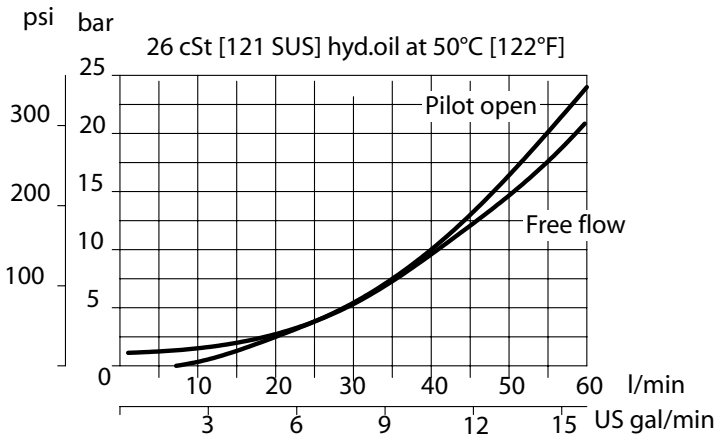
Dual counterbalance HIC's are used for controlling loads in bidirectional motion such as wheel motor applications or for cylinders going over center. They are also suitable for use on the boom and dipper cylinder on an excavator.

SPECIFICATIONS

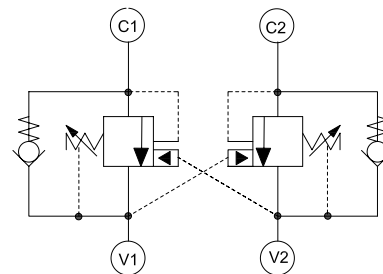
Rated pressure	350 bar [5075 psi]*
Rated flow at 22 bar (319 psi)	60 l/min [16 US gal/min]
Leakage	10 drops/min @ at 70% of crack pressure
Weight	0.90 kg [1.98 lb]
Pilot ratio	3.0:1, 4.5:1, 10.0:1
Cavity	CIB

* 350 bar with steel housing
 210 bar with aluminum housing

PERFORMANCE

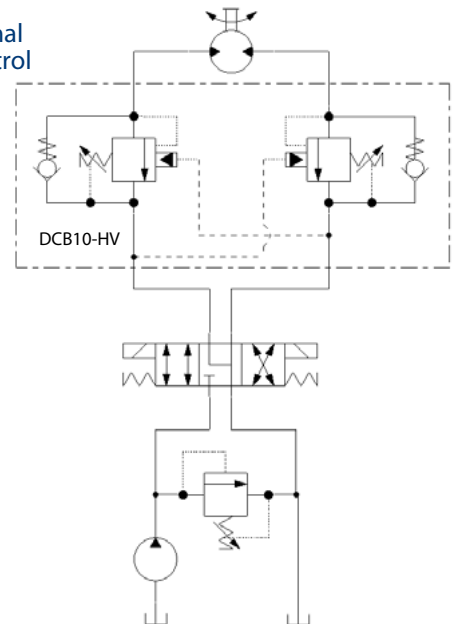


SCHEMATIC



EXAMPLE CIRCUIT

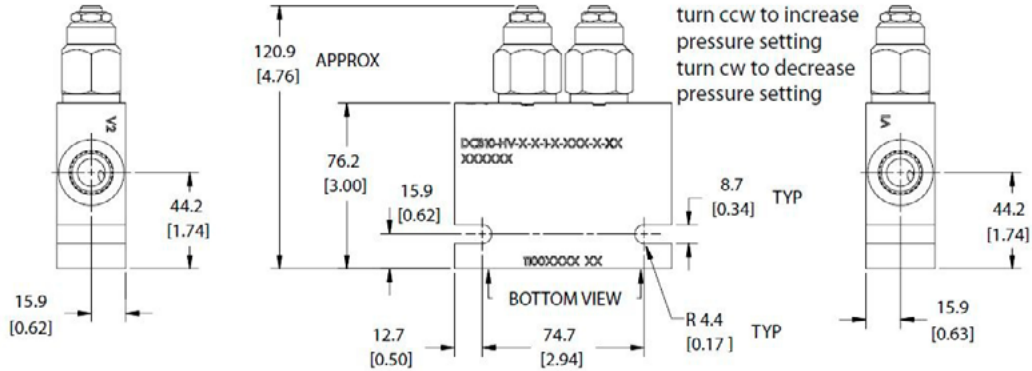
Bi-directional Motor Control



CB - Counterbalance Valves
 DCB10-HV

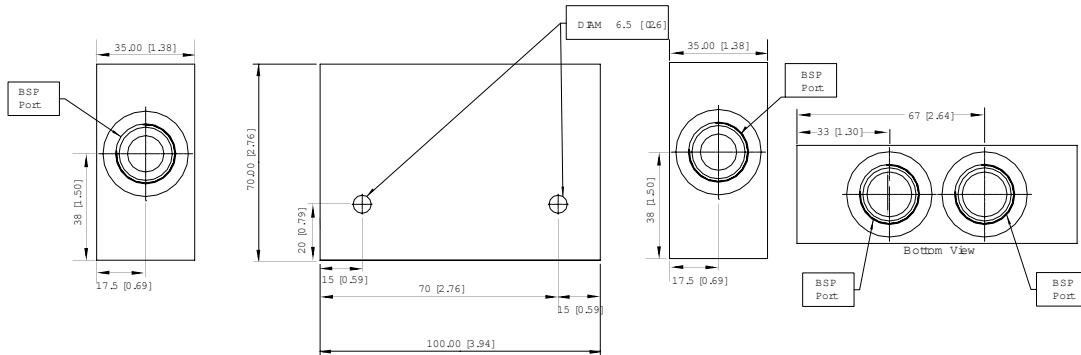
DIMENSIONS

mm [in]



SAE - Ported

mm [in]



BSP Ported - (Body Only)

CB - Counterbalance Valves
DCB10-HV

ORDERING INFORMATION

DCB10 - HV - 1 - A - 1 - E - XXX - B - 00

DCB10- HV: Dual counterbalance valve, 10-size, hydraulic vent

Code	Pilot Ratio
A	3 to 1
B	4.5 to 1
C	10 to 1

Pressure Range

1: Check crack pressure in bar 1 bar [14.5 psi]

Code	Pilot Ratio A (3:1) bar (psi)	Pilot Ratio B (4.5:1) bar (psi)	Pilot Ratio C (10:1) bar (psi)
1	35-110 [507-1595]	55-180 [797-2610]	90-350 [1305-5075]
2	60-150 [870 - 2175]	75-240 [1087-3480]	
3	80-230 [1160 - 3334]	90-350 [1305-5075]	

Code	Seal	Seal Kit
B	Buna-N	11002672
V	Viton	11002673

Pressure Setting [in bar]
XXX - No factory setting / no stamping

For customer specified settings, enter value in bar (Example 70 bar = 70; 125 bar = 125, etc.)

Adjustment type
E external adjustment
F tamper resistant

Housing & Ports	Housing P/N
SE3B AL, 3/8 BSP	922518510
SE4B AL, 1/2 BSP	922518610
SES4B Steel, 1/2 BSP	11034327
6S AL, #6 SAE	11002669
S6S Steel, #6 SAE	11009170
8S AL, #8 SAE	11001779
S8S Steel, #8 SAE	11009171

OPERATION

This dual counterbalance, internally piloted catalog HIC is a low leakage assembly with hydraulic vent. This HIC uses 2 CP441-1 12-size cartridges and allows free flow from the V port to the C ports and blocks flow in the reverse direction until the relief setting is reached, or until adequate pilot pressure has been applied to the opposite V port.



APPLICATIONS

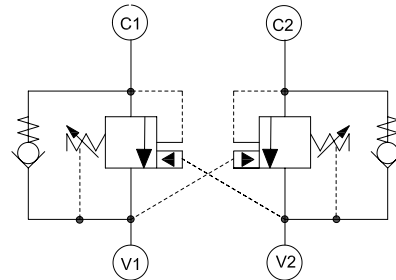
Dual counterbalance HIC's are used for controlling loads in bidirectional motion such as wheel motor applications or for cylinders going over center. They are also suitable for use on the boom and dipper cylinder on an excavator.

SPECIFICATIONS

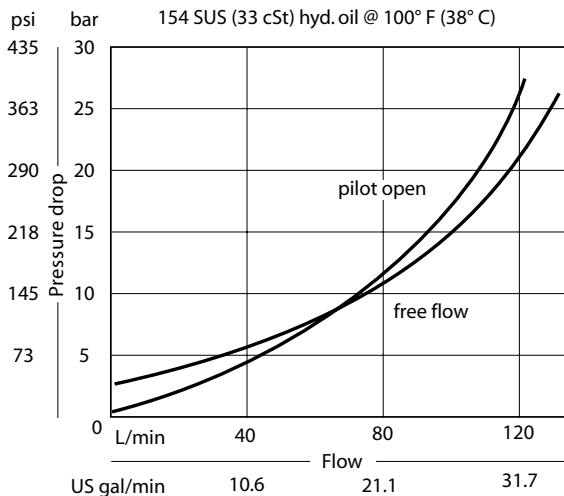
Rated pressure	350 bar [5075 psi]*
Rated flow at 22 bar (319 psi)	115 l/min [30 US gal/min]
Weight	1.26 kg [2.77 lb]
Pilot ratio	3:1, 4.5:1, 10:1
Cavity	CIB

* 350 bar with steel housing
 210 bar with aluminum housing

SCHEMATIC



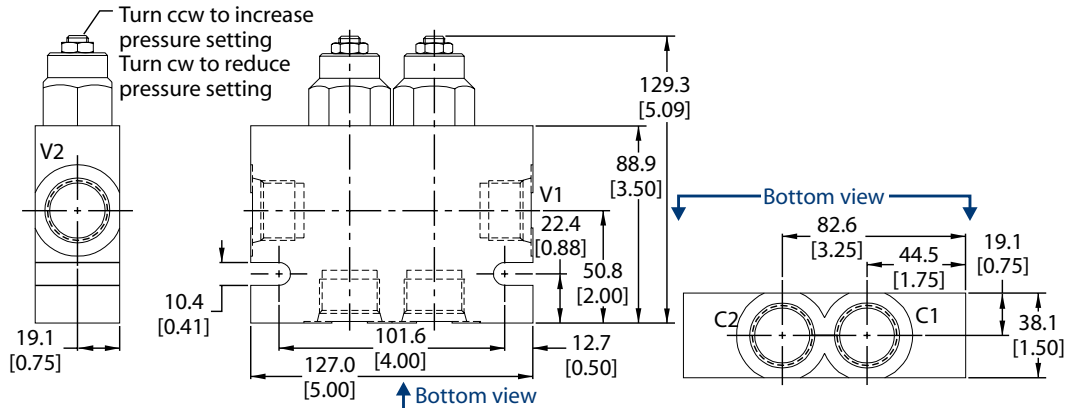
PERFORMANCE



CB - Counterbalance Valves
 CP441-2

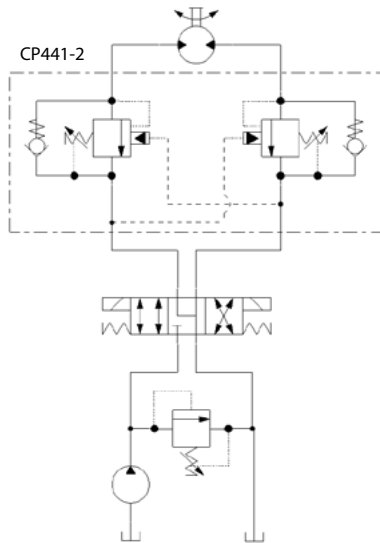
DIMENSIONS

mm [in]

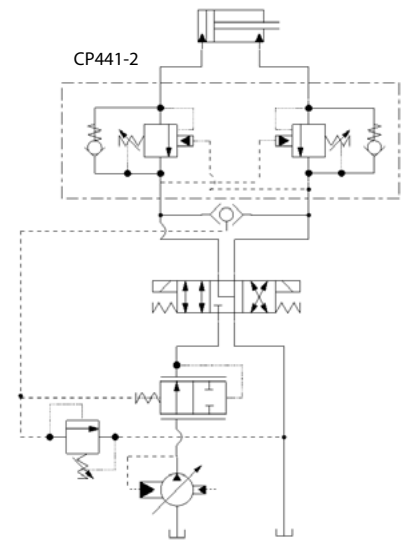


EXAMPLE CIRCUITS

Bi-directional Motor Control



Bi-directional Load Control



CB - Counterbalance Valves
CP441-2

ORDERING INFORMATION

CP441 - 2 - 12S - B - E - B - XXX - 4.5 - 015

CP441-2:
Dual counterbalance valve,
12 size, hydraulic vent

Housing & Ports	Housing P/N
4B AL, 1/2 BSP	221445
6B AL, 3/4 BSP	221446
10S AL, #10 SAE	220752
12S AL, #12 SAE	220753

E:
External
Adjustment

Code	Seal Material	Seal Kit
B	Buna	120414
V	Viton	120415

Code	Pilot Ratio
3.0	3.0:1
4.5	4.5:1
10.0	10.0:1

Free flow check
crack Pressure in psi

Code	psi	[bar]
005	5	.34
015	15	1.03

Pressure Setting in psi
XXX - Standard setting with no stamping

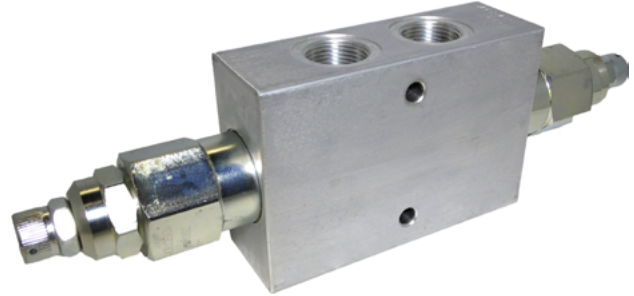
For customer specified setting,
code x 10 = total psi
Example: 150 x 10 = 1500 psi (insert 150 above)

Pressure Range

Code	Pilot Ratio 3.0:1 psi [bar]	Pilot Ratio 4.5:1 psi [bar]	Pilot Ratio 10.0:1 psi [bar]
A	500-1500 [34-103] Std. Setting 1000 [69]	500-2000 [34-138] Std. Setting 1500 [103]	100-5000 [69-345] Std. Setting 2500 [172]
B	1500-3000 [103-207] Std. Setting 2500 [172]	1500-5000 [103-345] Std. Setting 3000 [207]	

OPERATION

The VCB12-EN-DL is a dual counterbalance HIC, 12-size metric, hydraulically vented, internally-piloted, low leakage, with a nose to nose design. This catalog HIC allows free flow from the V ports to the C ports and blocks flow in the reverse direction until the relief setting is reached, or until adequate pilot pressure has been applied to the opposite V port.



APPLICATIONS

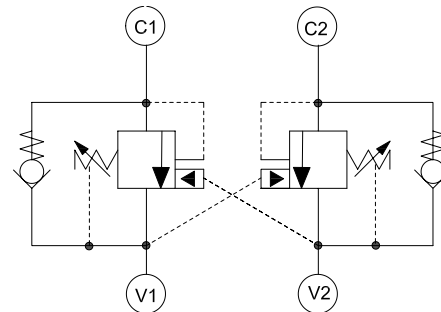
Use dual counterbalance HIC's for controlling loads in bidirectional motion such as wheel motor applications or for cylinders going over center. They are also suitable for use on the boom and dipper cylinder on an excavator.

SPECIFICATIONS

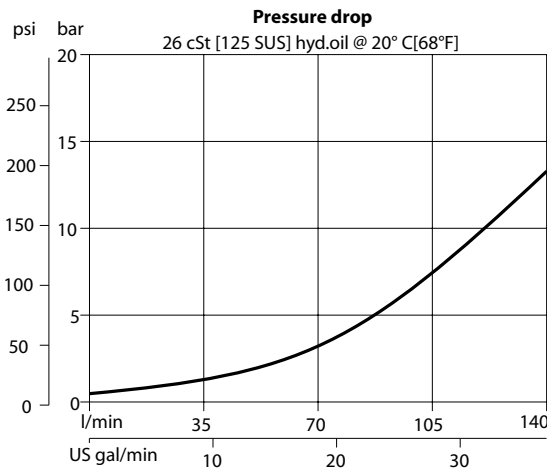
Rated pressure	350 bar [5075 psi]*
Rated flow at 22 bar (319 psi)	140 l/min [37 US gal/min]
Leakage	10 drops/min @ at 70% of crack pressure
Weight	2.54 kg [5.60 lb]
Pilot ratio	4.7:1, 5.9:1, 6.9:1
Cavity	CIB

* 350 bar with steel housing
 210 bar with aluminum housing

SCHEMATIC

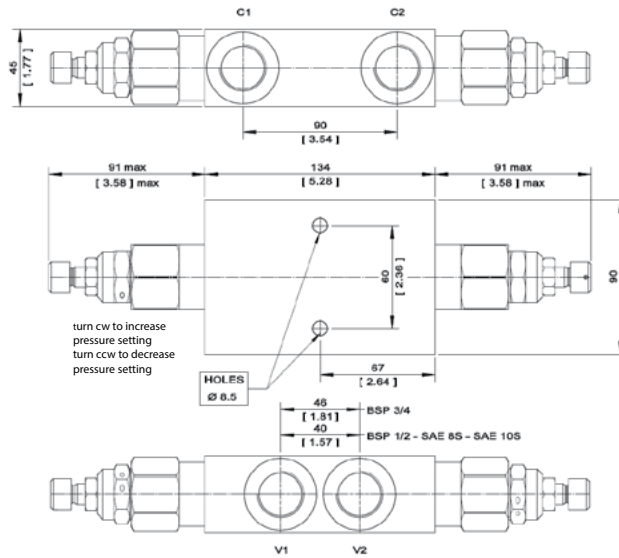


PERFORMANCE



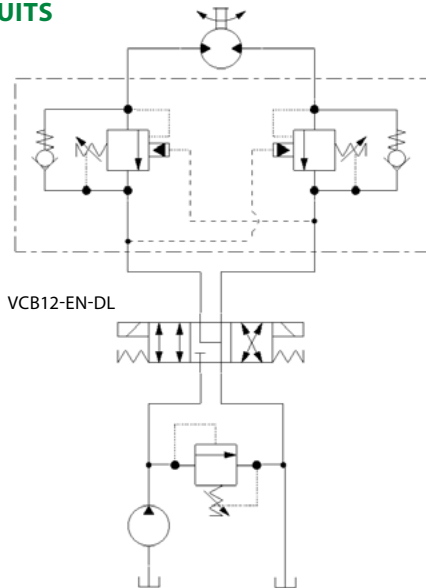
DIMENSIONS

mm [in]

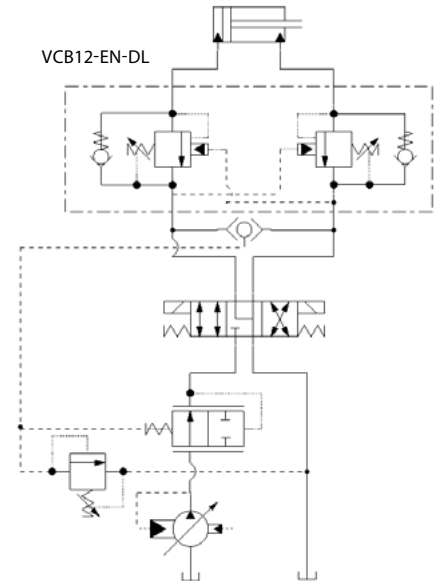


EXAMPLE CIRCUITS

Bi-directional Motion Control



Counterbalance with Pressure Limiting



ORDERING INFORMATION

VCB12 - EN - 2 - A - 00 - B - XXX

VCB12-EN:
Counterbalance Valve, Pilot Port 1, 12 size (metric), external adjustment, hydraulic vent

Code	Pilot Ratio
A	6.9:1
B	4.7:1
C	5.9:1

Pressure Range		
Code	Pilot Ratio A,C bar [psi]	Pilot Ratio B bar [psi]
1	25-140 [363-2031]	25-120 [363-1740]
2	70 - 250 [1015-3625]	60-200 [870-2900]
3	105 - 350 [1523-5075]	90-280 [1305-4060]

Code	Seal Material
B	Buna-N
V	Viton

Crack Pressure Setting [in bar]

XXX: No factory setting / no stamping

For customer specified settings, enter value in bar (Example 70 bar = 70; 125 bar = 125 etc.)

Housing & Ports	Housing Nomenclature
00: Cartridge Only	No Body
SE4B: AL, 1/2 BSP	NCS12-3-SE4B
SE6B: AL, 3/4 BSP	NCS12-3-SE6B
SES6B: Steel, 3/4 BSP	NCS12-3-SES6B
SE8S: AL, #8 SAE	NCS12-3-SE8S
SE12S: AL, #12 SAE	NCS12-3-SE12S

OPERATION

DCB20-HV: Dual counterbalance HIC, 20-size, hydraulic vent. This HIC is low leakage and internally piloted. The DCB20-HV uses 2 CB20-HV 20-size cartridges and allows free flow from the V port to the C ports and blocks flow in the reverse direction until the relief setting is reached, or until adequate pilot pressure has been applied to the opposite V port.



APPLICATIONS

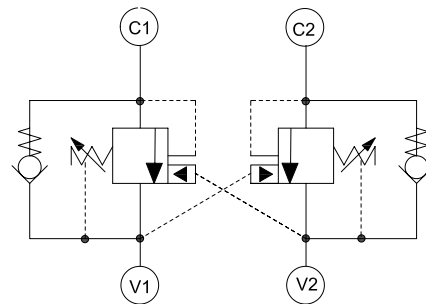
Use dual counterbalance HIC's for controlling loads in bidirectional motion such as wheel motor applications or for cylinders going over center. They are also suitable for use on the boom and dipper cylinder on an excavator.

SPECIFICATIONS

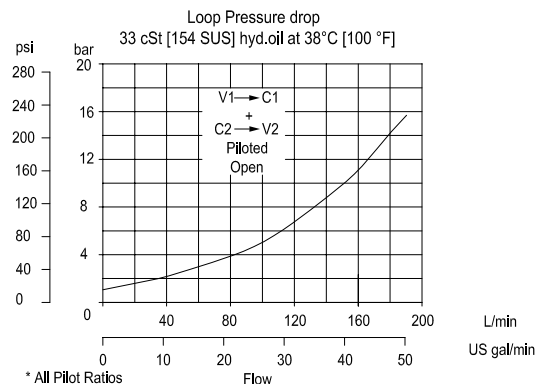
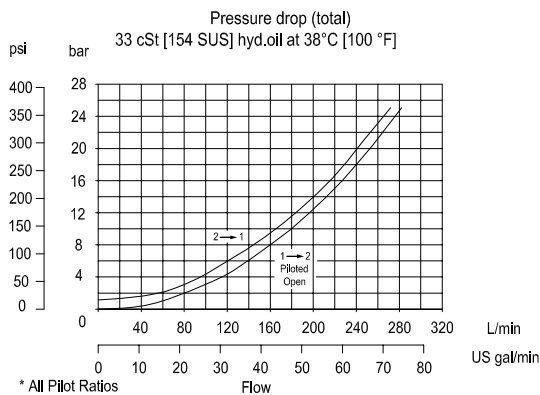
Rated pressure	350 bar [5075psi]*
Rated flow at 22 bar (319 psi)	266 l/min [70 US gal/min]
Leakage	10 drops/min @ at 70% of crack pressure
Weight	Aluminum 5.59 kg [12.59 lb] Ductile 10.68 kg [23.55 lb]
Pilot ratio	3.0:1, 4.5:1, 10.0:1
Cavity	CIB

* 350 bar with steel housing
 210 bar with aluminum housing

SCHEMATIC

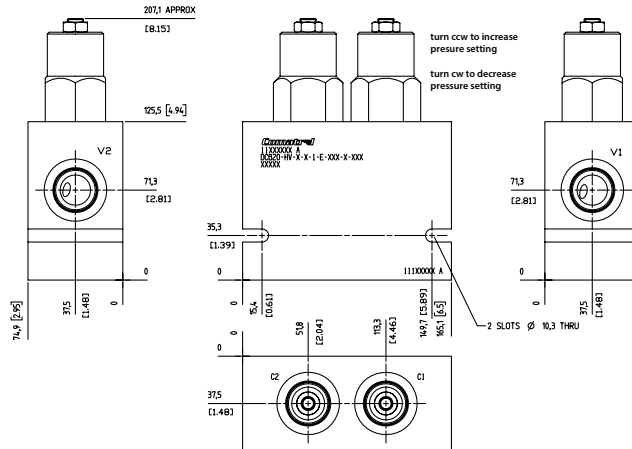


PERFORMANCE



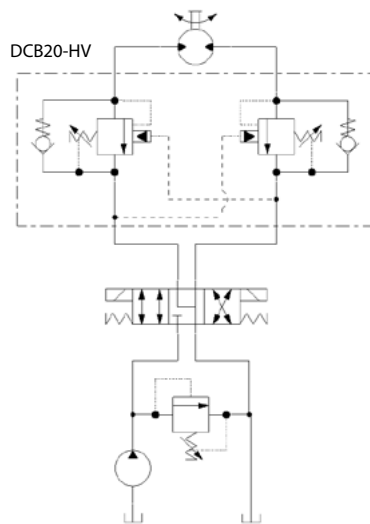
DIMENSIONS

mm [in]

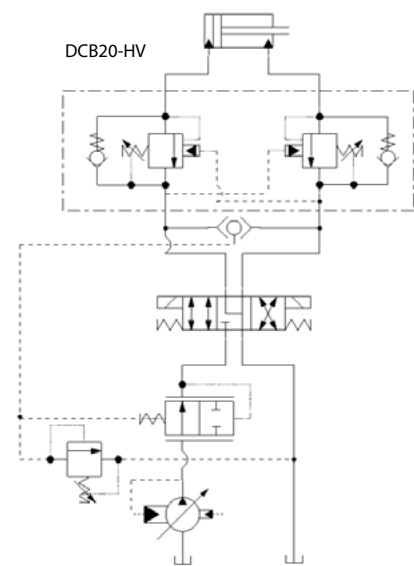


EXAMPLE CIRCUITS

Bi-directional Counterbalance



Counterbalance with Pressure Limiting



ORDERING INFORMATION

DCB20 - HV - 1 - A - 1 - E - XXX - B - 00

DCB20-HV:
Dual counterbalance valve,
20-size, hydraulic vent

Code	Pilot Ratio
A	3 to 1
B	4.5 to 1
C	10 to 1

1: Check crack pressure in bar
1 bar [14.5 psi]

Code	Pressure Range		
	Pilot Ratio A (3:1) bar [psi]	Pilot Ratio B (4.5:1) bar [psi]	Pilot Ratio C (10:1) bar [psi]
1	35-110 [507-1595] Std. Setting 70 [1015]	35-140 [507-2030] Std. Setting 100 [1450]	70-345 [1015-5000] Std. Setting 170 [2465]
2	100-210 [1450-3045] Std. Setting 170 [2465]	100-345 [1450-5000] Std. Setting 200 [2900]	

Code	Seal	Seal Kit (1 valve)
B	Buna-N	120380
V	Viton	120381

Pressure Setting [in bar]
XXX - Std. setting with no stamping

For customer specified settings, enter value in bar (Example 70 bar = 70; 125 bar = 125, etc.)

Adjustment type
E external adjustment

Body & Ports	Body Nomenclature
8B AL, 1 BSP	DCB20-3S-8B
10B AL, 1-1/4 BSP	DCB20-3S-10B
S10B Steel, 1-1/4 BSP	DCB20-3S-S10B
16S AL, #16 SAE	DCB20-3S-16S
S16S Steel, #16 SAE	DCB20-3S-S16S
20S AL, #20 SAE	DCB20-3S-20S
S20S Steel, #20 SAE	DCB20-3S-S20

OPERATION

The VCB06-CN-DL is a dual counterbalance HIC, 6-size metric, nose to nose design with atmospheric vent. This catalog HIC allows free flow from the V ports to the C ports and blocks flow in the reverse direction until the relief setting is reached, or until adequate pilot pressure has been applied to the opposite V port.



APPLICATIONS

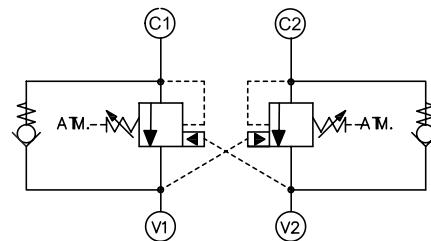
Atmospherically vented HIC's are applied when it is not practical to connect a separate vent line to the tank. Use dual counterbalance HIC's for controlling loads in bidirectional motion such as wheel motor applications or for cylinders going over center.

SPECIFICATIONS

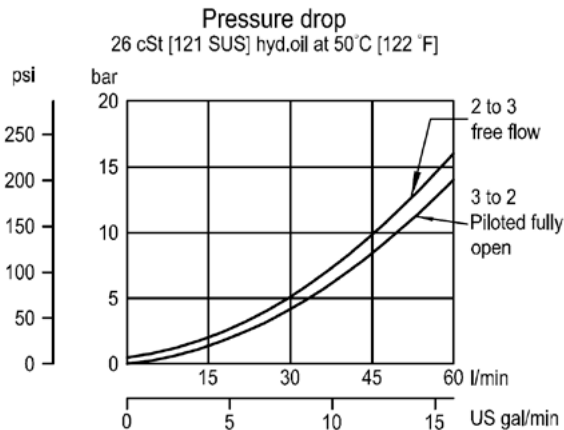
Rated pressure	350 bar [5075 psi]*
Rated flow at 22 bar [319 psi]	60 l/min [16 US gal/min]
Leakage	10 drops/min @ at 70% of crack pressure
Weight	0.96 kg [2.15 lb]
Pilot ratio	4.1:1, 7.1:1
Cavity	CIB

* 350 bar with steel housing
 210 bar with aluminum housing

SCHEMATIC

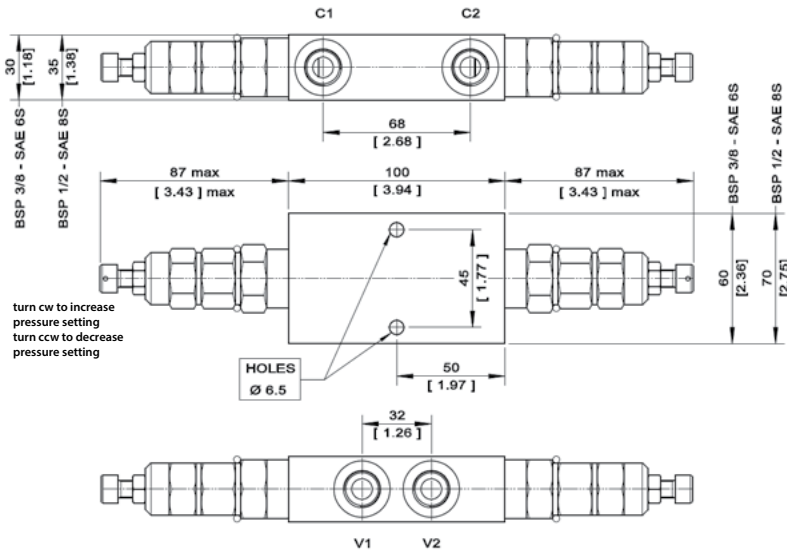


PERFORMANCE



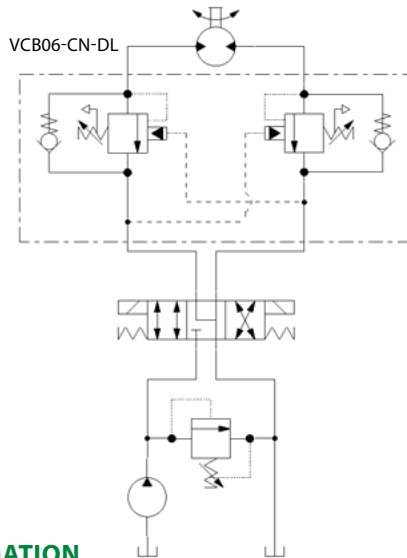
DIMENSIONS

mm [in]

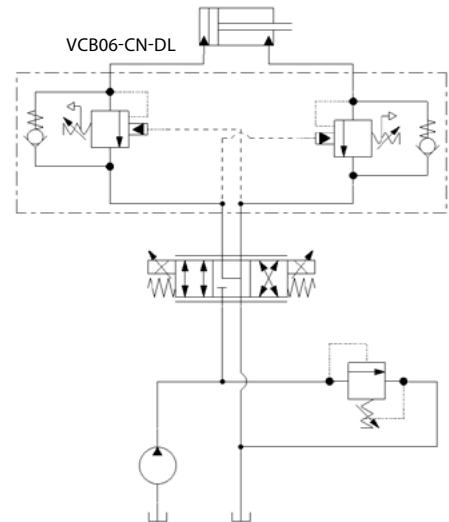


EXAMPLE CIRCUITS

Bi-directional Motion Control



Counterbalance - Double Actuator



ORDERING INFORMATION

VCB06 - CN - 2 - A - DL4B - B XXX

VCB06-CN:
Dual Counterbalance Valve,
Pilot Port 1, 6 size (metric),
internal adjustment,
atmospheric vent

Code	Pressure Range bar [psi]
1	25-140 (363-2030)
2	70 - 210 (1015-3045)
3	105 - 350 (1523-5075)

Code	Pilot Ratio
A	7.1:1
B	4.1:1

Code	Seal Material
B	Buna-N
V	Viton

Housing & Ports	Housing P/N
DL3B: AL, 3/8 BSP	NCS06-3-DL3B
DL4B: AL, 1/2 BSP	NCS06-3-DL4B
DL6S: AL, #6 SAE	NCS06-3-DL6S
DL8S: AL, #8 SAE	NCS06-3-DL8S

Crack Pressure Setting [in bar]

XXX: No factory setting / no stamping

For customer specified settings, enter value in bar (Example 70 bar = 70; 125 bar = 125 etc.)

OPERATION

DCB10-AV: Dual counterbalance HIC, 10-size, atmospheric vent. This HIC is low leakage and internally piloted. The DCB10-AV uses 2 CB10-AV 10-size cartridges and allows free flow from the V port to the C ports and blocks flow in the reverse direction until the relief setting is reached, or until adequate pilot pressure has been applied to the opposite V port.



APPLICATIONS

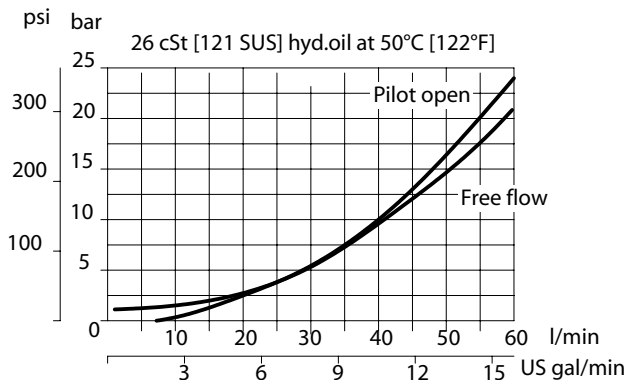
Atmospheric vented valves are applied when it is not practical to connect a separate vent line to the tank. Use dual counterbalance HIC's for controlling loads in bidirectional motion such as wheel motor applications or for cylinders going over center. They are also suitable for use on the boom and dipper cylinder on an excavator.

SPECIFICATIONS

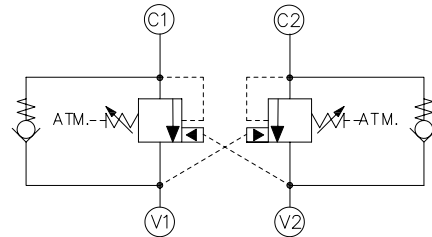
Rated pressure	350 bar [5075 psi]*
Rated flow at 22 bar (319 psi)	60 l/min [16 US gal/min]
Leakage	10 drops/min @ at 70% of crack pressure
Weight	0.90 kg [1.98 lb]
Pilot ratio	3.0:1, 4.5:1, 10.0:1
Cavity	CIB

* 350 bar with steel housing
 210 bar with aluminum housing

PERFORMANCE

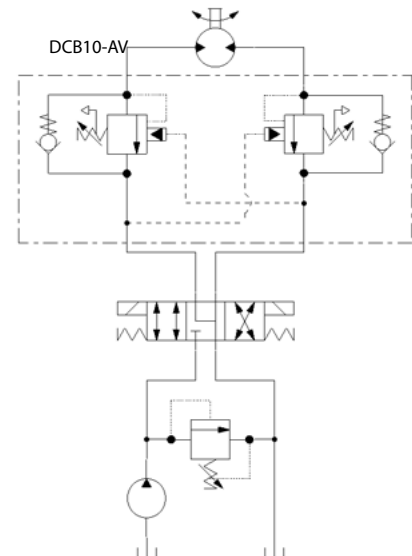


SCHEMATIC



EXAMPLE CIRCUITS

Bi-directional Motor Control

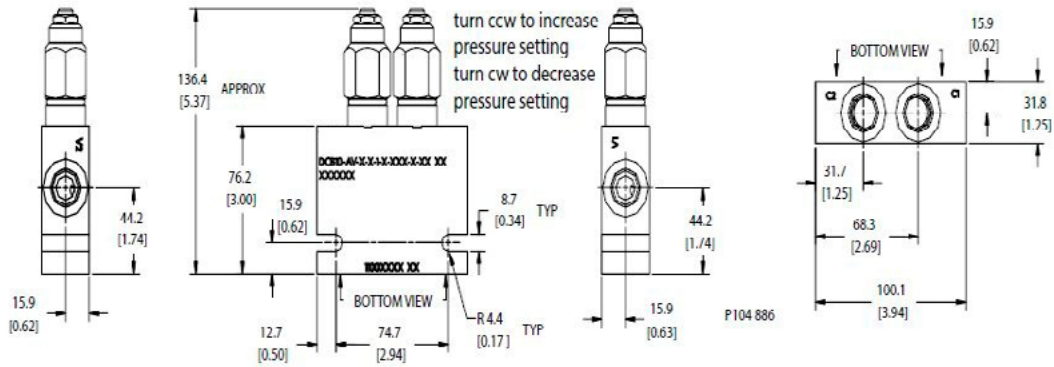


DIMENSIONS

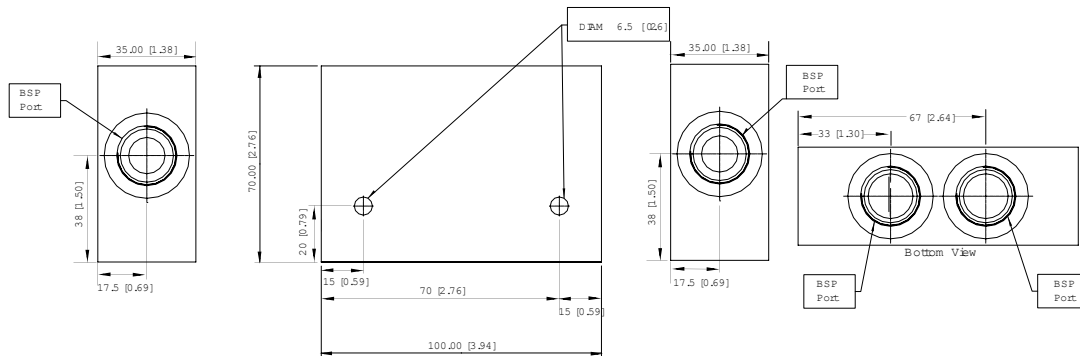
mm [in]

Cross-sectional view

SAE - Ported



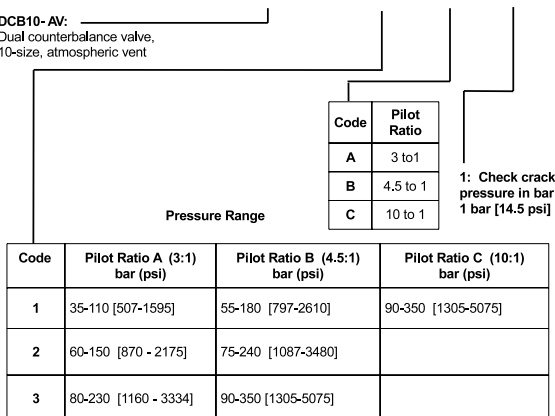
BSP Ported - (Body Only)



ORDERING INFORMATION

DCB10 - AV - 1 - A - 1 - E - XXX - B - 00

DCB10-AV:
Dual counterbalance valve,
10-size, atmospheric vent



Code	Seal	Seal Kit
B	Buna-N	11002672
V	Viton	11002673

Pressure Setting [in bar]
XXX - No factory setting / no stamping

For customer specified settings, enter value in bar (Example 70 bar = 70; 125 bar = 125, etc.)

Adjustment type
E external adjustment
F tamper resistant

Housing & Ports	Housing P/N
SE3B AL, 3/8 BSP	922518510
SE4B AL, 1/2 BSP	922518610
SES4B Steel, 1/2 BSP	11034327
6S AL, #6 SAE	11002669
S6S Steel, #6 SAE	11009170
8S AL, #8 SAE	11001779
S8S Steel, #8 SAE	11009171

OPERATION

The VCB12-CN-DL is a dual counterbalance HIC, 12-size metric, nose to nose design with atmospheric vent. This catalog HIC allows free flow from the V ports to the C ports and blocks flow in the reverse direction until the relief setting is reached, or until adequate pilot pressure has been applied to the opposite V port.



APPLICATIONS

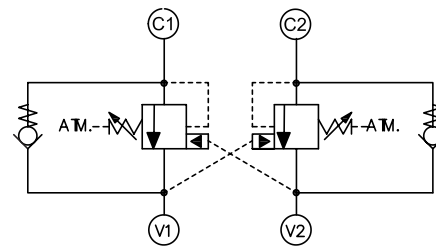
Atmospherically vented valves are applied when it is not practical to connect a separate vent line to the tank. Use dual counterbalance HIC's for controlling loads in bidirectional motion such as wheel motor applications or for cylinders going over center.

SPECIFICATIONS

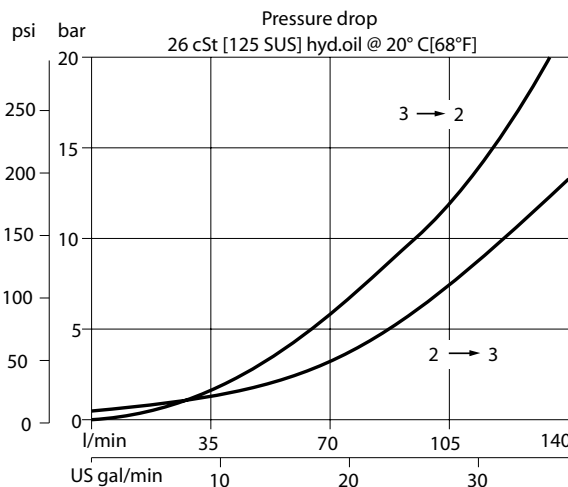
Rated pressure	350 bar [5075 psi]*
Rated flow at 22 bar (319 psi)	140 l/min [37 US gal/min]
Weight	2.92 kg [6.45 lb]
Pilot ratio	4.7:1, 5.9:1, 6.9:1
Cavity	CIB

* 350 bar with steel housing
 210 bar with aluminum housing

SCHEMATIC

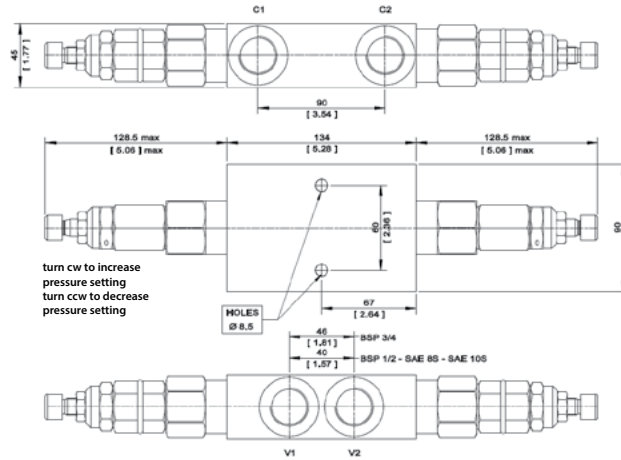


PERFORMANCE



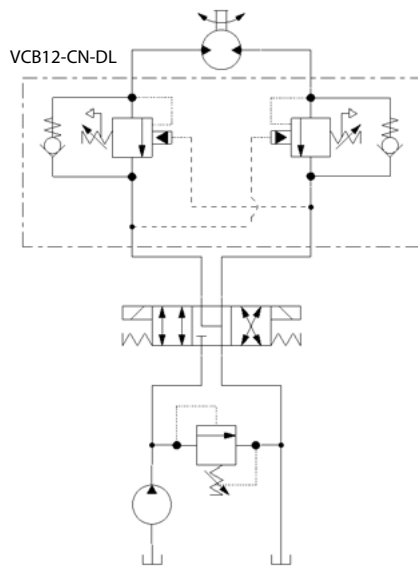
DIMENSIONS

mm [in]

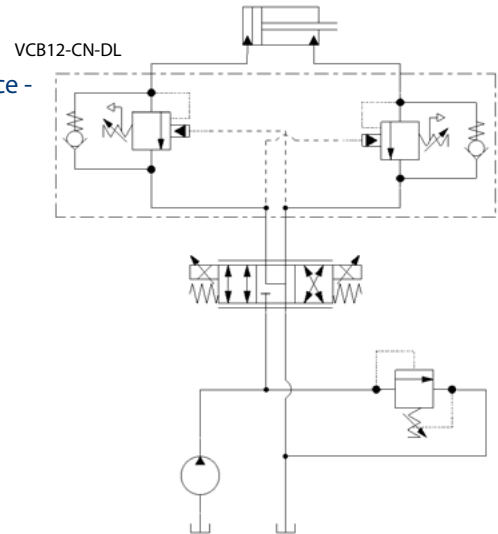


EXAMPLE CIRCUITS

Bi-directional Motion Control



Counterbalance - Double Actuator



CB - Counterbalance Valves
VCB12-CN-DL

ORDERING INFORMATION

VCB12 - CN - 2 - A - 00 - B - XXX

VCB12-CN:
Counterbalance Valve, Pilot Port 1, 12 size (metric), internal adjustment, atmospheric vent

Code	Pilot Ratio
A	6.9:1
B	4.7:1
C	5.9:1

Code	Seal Material
B	Buna-N
V	Viton

Crack Pressure Setting [in bar]

XXX: No factory setting / no stamping

For customer specified settings, enter value in bar (Example 70 bar = 70; 125 bar = 125 etc.)

Pressure Range		
Code	Pilot Ratio A,C bar [psi]	Pilot Ratio B bar [psi]
1	25-140 [363-2031]	25-120 [363-1740]
2	70 - 250 [1015-3625]	60-200 [870-2900]
3	105 - 350 [1523-5075]	90-280 [1305-4060]

Housing & Ports	Housing Nomenclature
00: Cartridge Only	No Body
SE4B: AL, 1/2 BSP	NCS12-3-SE4B
SE6B: AL, 3/4 BSP	NCS12-3-SE6B
SES6B: Steel, 3/4 BSP	NCS12-3-SES6B
SE8S: AL, #8 SAE	NCS12-3-SE8S
SE12S: AL, #12 SAE	NCS12-3-SE12S

OPERATION

Dual counterbalance HIC, 10-size, hydraulic vent with make-up checks. This is an internally piloted, low leakage assembly. The DCB10-MC uses two CB10-HV cartridges and four CP100-3 check valves, allowing free flow from the V port to the C ports and blocks flow in the reverse direction until the relief setting is reached, or until adequate pilot pressure has been applied to the opposite V port. Connect the T port to a tank line to allow for make-up flow into the circuit.



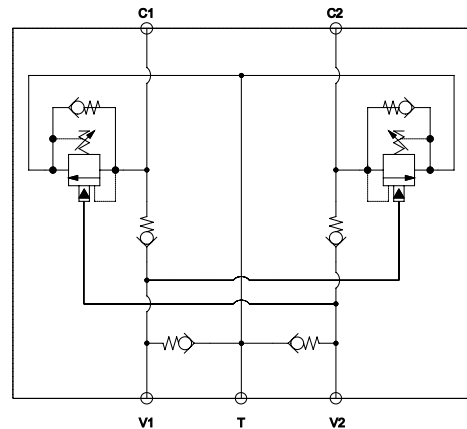
APPLICATIONS

Dual counterbalance HIC's are used for controlling loads in bidirectional motion such as wheel motor applications or for cylinders going over center. They are also suitable for use on the boom and dipper cylinder on an excavator. When make-up feature is needed, connect 'T' port to reservoir or charge system. This allows the load to be smoothly controlled with minimum energy loss. If load tries to run ahead of pump, pilot pressure will decrease and the relief section will throttle or close to prevent runaway. The T port is also useful in cylinder applications where directional valves (specifically proportional valves) are sensitive to flow intensification of powering the rod side. The DCB10-MC diverts flow directly to tank and bypasses the directional valve. This HIC technically replaces the 1EEC11-01.

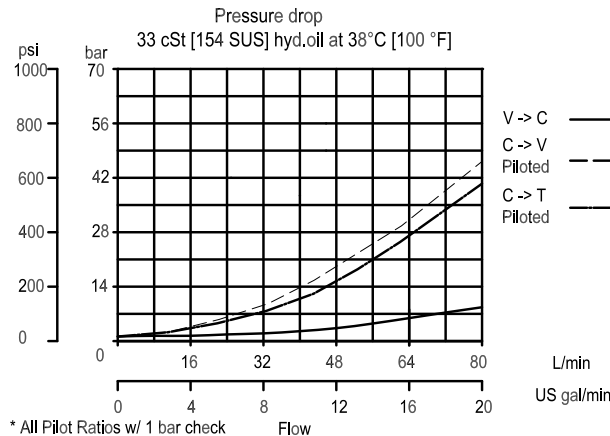
SPECIFICATIONS

Rated pressure	350 bar [5075 psi]*
Rated flow at 22 bar (319 psi)	57 l/min [15 US gal/min]
Weight	2.39 kg [5.27 lb], Aluminum 5.04 kg [11.11 lb], Ductile
Pilot ratio	3.0:1, 4.5:1, 10.0:1
Cavity	CIB

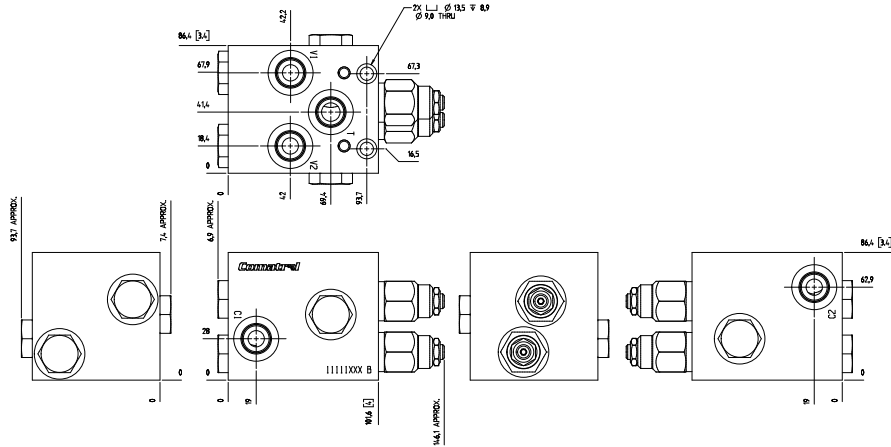
SCHEMATIC



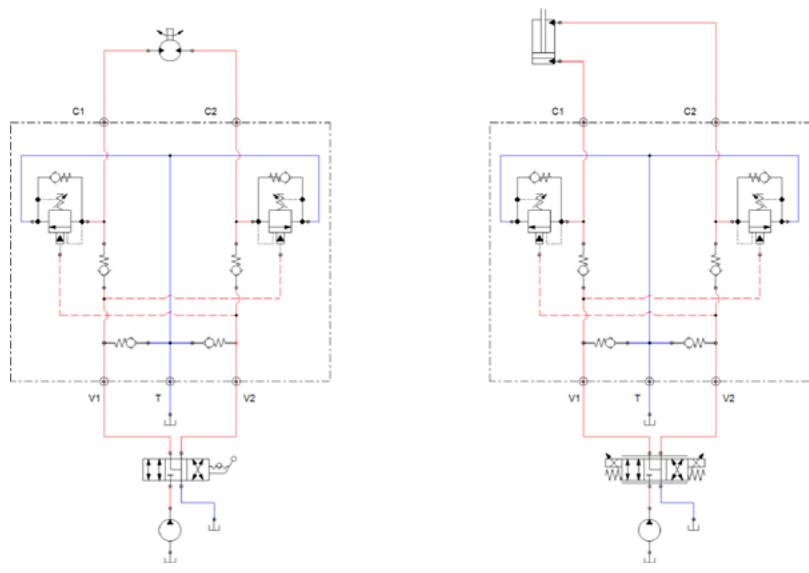
PERFORMANCE



DIMENSIONS



EXAMPLE CIRCUITS



ORDERING INFORMATION

DCB10-MC-1-A-1-E-70-B-8S

Dual Counterbalance HIC #10 size, Make-up Checks

Code	Spring range
For Pilot Ratio A (3.0:1)	
1	35-110 bar [508-1595 psi]
2	60-150 bar [870-2175 psi]
3	80-230 bar [1160-3335]
For Pilot Ratio B (4.5:1)	
1	55-180 bar [797-2610 psi]
2	75-240 bar [1087-3480 psi]
3	90-350 bar [1305-5075 psi]
For Pilot Ratio C (10:1)	
1	90-345 bar [1305-5003 psi]

Code	Pilot ratio
A	3.0:1
B	4.5:1
C	10.0:1

Code	Free flow check crack pressure
1	1 bar [15 psi]
.03	.03 bar [5 psi]

Code	Seal Material
B	Buna
V	Viton

Code	Ports	Material
3B	G3/8 BSP	Aluminum
4B	G1/2 BSP	Aluminum
S4B	G1/2 BSP	Ductile Iron
6S	#6 SAE	Aluminum
8S	#8 SAE	Aluminum
S6S	#6 SAE	Ductile Iron
S8S	#8 SAE	Ductile Iron

*Consult factory for other available housings.

Code	Cracking pressure
XXX	Standard Setting in bar
70	70 bar [1015 psi]
100	100 bar [1450 psi]
175	175 bar [2537 psi]
210	210 bar [3045 psi]
240	240 bar [3480 psi]
275	275 bar [3988 psi]
310	310 bar [4495 psi]

Adjustment E : External

CB - Counterbalance Valves
DCB10-MC

OPERATION

Dual counterbalance HIC, 12-size, hydraulic vent with make-up checks. This is an internally piloted, low leakage assembly. The DCB12-MC uses two CP441-1 cartridges and four CP100-3 check valves, allowing free flow from the V port to the C ports and blocks flow in the reverse direction until the relief setting is reached, or until adequate pilot pressure has been applied to the opposite V port. Connect the T port to a tank line to allow for make-up flow into the circuit.



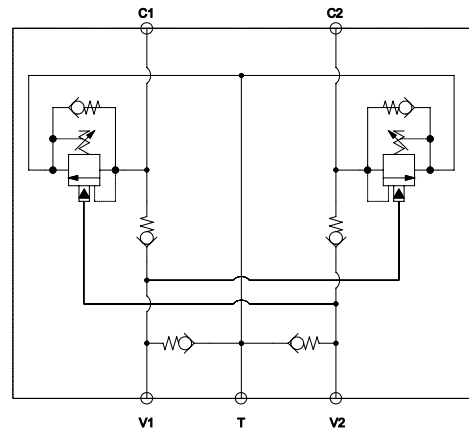
APPLICATIONS

Dual counterbalance HIC's are used for controlling loads in bidirectional motion such as wheel motor applications or for cylinders going over center. They are also suitable for use on the boom and dipper cylinder on an excavator. When make-up feature is needed, connect 'T' port to reservoir or charge system. This allows the load to be smoothly controlled with minimum energy loss. If load tries to run ahead of pump, pilot pressure will decrease and the relief section will throttle or close to prevent runaway. The T port is also useful in cylinder applications where directional valves (specifically proportional valves) are sensitive to flow intensification of powering the rod side. The DCB12-MC diverts flow directly to tank and bypasses the directional valve. This HIC technically replaces the 1EEC12-01.

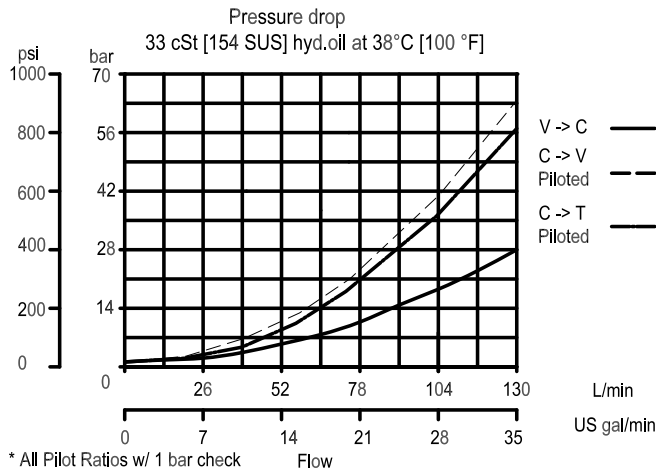
SPECIFICATIONS

Rated pressure	210 bar [3045 psi], Aluminum 350 bar [5075 psi], Ductile
Rated flow at 22 bar (319 psi)	95 l/min [25 US gal/min]
Weight	3.13 kg [6.90 lbs], Aluminum 6.98 kg [15.39 lbs], Ductile
Pilot ratio	3.0:1, 4.5:1, 10.0:1
Cavity	CIB

SCHEMATIC

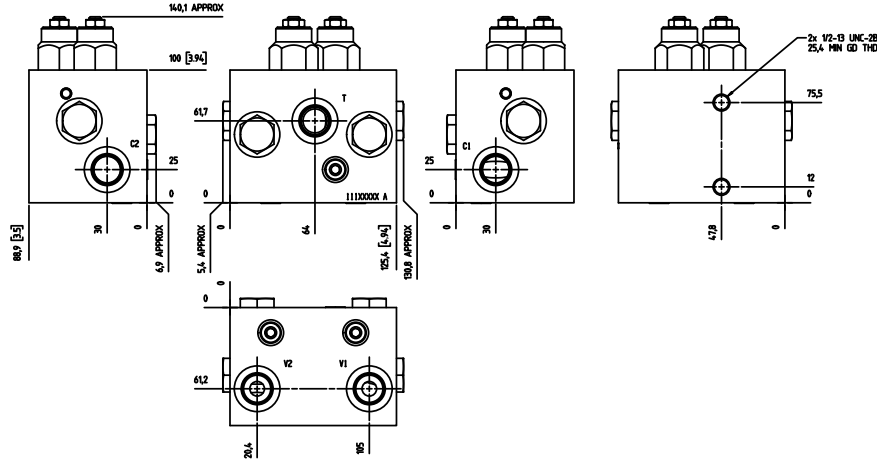


PERFORMANCE

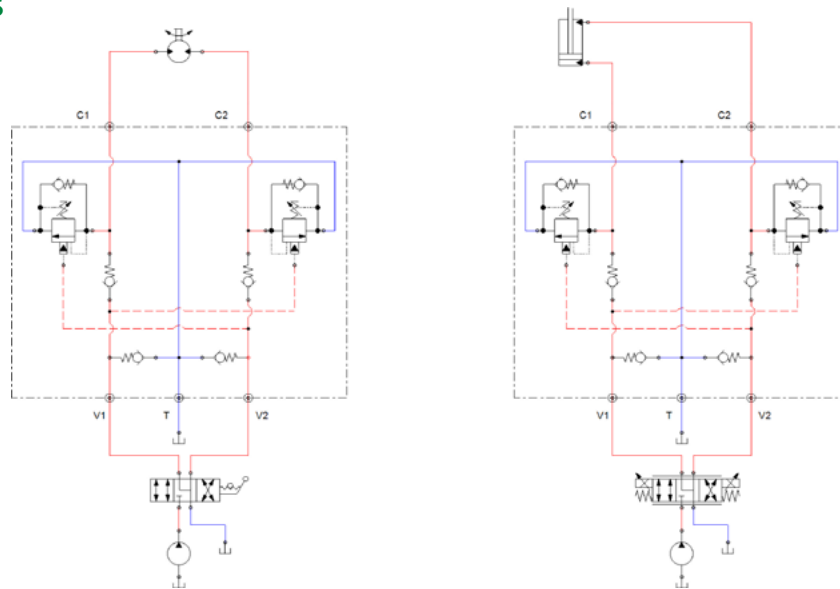


CB - Counterbalance Valves
 DCB12-MC

DIMENSIONS



EXAMPLE CIRCUITS



ORDERING INFORMATION

DCB12-MC-1-A-1-E-70-B-12S

Dual Counterbalance HIC
 #10 size, Make-up Checks

Code	Spring range
	For Pilot Ratio A (3.0:1)
1	34-103 bar [500-1500 psi]
2	103-207 bar [1500-3000 psi]
	For Pilot Ratio B (4.5:1)
1	34-138 bar [500-2000 psi]
2	103-345 bar [1500-5000 psi]
	For Pilot Ratio C (10:1)
1	69-345 bar [1000-5000 psi]

Code	Pilot ratio
A	3.0:1
B	4.5:1
C	10.0:1

Code	Free flow check crack pressure
1	1 bar [15 psi]
.03	.03 bar [5 psi]

Code	Seal Material
B	Buna
V	Viton

Code	Ports	Material
6B	G3/4 BSP	Aluminum
S6B	G3/4 BSP	Ductile Iron
10S	#10 SAE	Aluminum
12S	#12 SAE	Aluminum
S10S	#10 SAE	Ductile Iron
S12S	#12 SAE	Ductile Iron

*Consult factory for other available housings.

Code	Cracking pressure
XXX	Standard Setting in bar
70	70 bar [1015 psi]
100	100 bar [1450 psi]
175	175 bar [2537 psi]
210	210 bar [3045 psi]
240	240 bar [3480 psi]
275	275 bar [3988 psi]
310	310 bar [4495 psi]

Adjustment
 E : External

**CB - Counterbalance Valves
 DCB12-MC**

